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OF THE
UNITED STATES

Birds and Mammals of Mount McKinley National Park

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FAUNA OF THE NATIONAL PARKS

OF THE UNITED STATES

Birds & Mammal

OF MOUNT McKINLEY NATIONAL PARK ALASKA

BY

JOSEPH S. DIXON

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INTRODUCTION

THE ANIMAL LIFE of Mount McKinley National Park is surpassed as a park attraction only by "Denali" itself.[1] Inquiry among many of the visitors to this remote and primitive region has shown that, in many instances, the unique opportunity to see vast numbers of caribou, Dall sheep, grizzly bears, and Alaska ptarmigan, together with lesser numbers of such rare breeding birds as the wandering tattler and surfbird, has been one of their chief reasons for making the long journey north, since, as a group, all of the above-named species are not known to occur in any other national park.

Furthermore, because of its geographical position and the climatic conditions of the region, Mount McKinley, the highest peak in North America, is often enveloped in clouds for weeks at a time during the summer or tourist season. Many visitors, thus denied even a glimpse of the mountain, become interested in the abundant animal life.

The basic and fundamental function of the national parks is the "preservation of outstanding works of nature for the inspiration, education, and enjoyment of this and future generation." As has been pointed out, the animal life of Mount McKinley National Park from this precept is peculiarly outstanding in importance.

The two greatest "animal" national parks in America are Mount McKinley and Yellowstone, and the former, because of its remote location, favorable climatic conditions, and large size, is the only park today that contains an adequate and abundant breeding stock both of wild game and of large carnivorous animals. Too, the natural association and interrelation of certain typical but vanishing examples of North American mammals, such as grizzly bear, wolverine, timber wolf, caribou, and Alaska mountain sheep, can probably be maintained by reason of the adequate room and the suitable forage conditions.

In recognition of the national and future importance of this outstanding assemblage of animal life, a detailed survey of the birds and mammals of Mount McKinley National Park was instituted and carried forward to completion through the cooperation of the National Park Service and the University of California.

Carrying out a field policy of the Museum of Vertebrate Zoology, University of California, a survey of the wild animal life of Mount McKinley National Park was begun by the late George M. Wright and myself during the spring and summer of 1926. The field investigations were made pos-

[1] Denali is the Indian name for McKinley.

sible by the joint support and sponsorship of Annie M. Alexander, through the Museum of Vertebrate Zoology of the University of California, and John E. Thayer, of Lancaster, Mass. Previous to this visit, relatively little was published concerning the birds and small mammals of this region.

The late Charles Sheldon, noted naturalist and big game hunter of Washington, D. C., spent the latter part of July and the month of August 1906, about the northern base of Mount McKinley and in the vicinity of the headwaters of Toklat River. Mr. Sheldon, while occupied chiefly in hunting and in studying the habits of mountain sheep and other large game, also had an opportunity to collect specimens of certain of the smaller mammals found in the park. In 1907, Dr. Wilfred H. Osgood, now curator of zoology in the Field Museum of Natural History at Chicago, reported Mr. Sheldon's collections in the Proceedings of the Biological Society of Washington, volume 20, pages 59–60. As a result of Mr. Sheldon's activities, Dr. Osgood was able to report the presence of 23 different kinds of mammals in what is now the park.

In July 1907, Mr. Sheldon returned to the McKinley region and spent the winter of 1907–08 there. His headquarters were in a log cabin which he built on the main Toklat River about 2 miles below the point where the highway now crosses this stream. He remained there carrying on his hunting and collecting until the middle of June 1908. In The Auk, volume 26, number 1, January 1909, Mr. Sheldon published a List of Birds Observed on the Upper Toklat River near Mount McKinley, Alaska, 1907–8 in which he reports on 62 species of birds. Later publications indicate that about 30 species and geographic races of mammals were encountered by Mr. Sheldon in the McKinley region between 1906 and 1908.

The numerous references to (Sheldon, 1930) in this publication pertain to The Wilderness of Denali, an outstanding volume on the wildlife of the McKinley region published in 1930 by Mrs. Sheldon through Charles Scribner's Sons. The manuscript of the book was prepared by Mr. Sheldon from his Alaskan journals and after his death was edited by two of his friends, Dr. C. Hart Merriam and Dr. E. W. Nelson.

In 1923, O. J. Murie of the United States Bureau of Biological Survey spent several weeks in the Mount McKinley region studying caribou. His account of the discovery of the first-known nest of the wandering tattler, which he located there, was published in 1924 in The Auk, volume 41, pages 231–237.

In 1926, field work was carried on in the Mount McKinley region by Mr. Wright and myself from May 19 to July 30. Seventy-two days were spent in the field, during which time a distance of approximately 500 miles

was traversed on foot, covering in considerable detail the regular routes traveled by visitors to the park. A bird's-eye view of the animal life as it would be seen by most visitors was gained at this time. As a result of these field investigations 86 kinds of birds and 25 kinds of mammals were identified as definitely occurring within the park boundaries. About 75 out of the total number of birds recorded are known to nest within the park. While in the field time and effort were about equally divided between (1) studying living birds and mammals in their native habitats, often with the aid of binoculars, (2) recording these life history data with camera and notebook, and (3) collecting and preserving specimens for positive identification. As a result, 168 specimens of birds, 83 study-skins of mammals, 2 birds' nests, 4 sets of birds' eggs, 350 photographs, and 280 pages of notes were secured.

In May 1932, I started on my sixth expedition to Alaska, returning to Mount McKinley National Park to complete the study of animal life of the park that Mr. Wright and I had begun in 1926. I arrived at the park on May 15 and remained there until September 1, 1932. During the 110-day stay, I visited all of the localities where Mr. Wright and I had worked in 1926, as well as most of the localities that Charles Sheldon had visited in 1906–8. A fair comparison of the present and past status of the animal life of the region was thus obtained.

A careful study of the effects of predatory animals upon other species in the park was recorded by camera and in notebook, and by constantly watching for record specimens and judiciously collecting them, a new species of plant was discovered, and the known breeding ranges of certain birds were extended several hundred miles. On this expedition the known list of mammals of the McKinley region was brought up to 34 species, and the bird list was increased to 107 species.

In describing the different animals of the park the endeavor has been at all times to keep in mind the obvious fact that the living animal, in its natural environment, is the outstanding attraction. For this reason, the technical details and other characters which would be of interest chiefly to scientists or would be noticeable only when specimens were actually in hand, have been subordinated and special emphasis has been placed in recording both by pen and by camera the outstanding characters and identification marks of the living animals in the field.

In taking up the life histories of the various species or kinds of animals encountered in the park each species has been treated under two general headings: (1) The general appearance of the animal is given, stressing any specially developed items such as size, color, ears, tail, and horns which may be of particular interest; (2) the endeavor has been made to list diag-

nostic marks or characters which have been found to be most useful and reliable as "field marks" to assist in the identification of the living animal

For the field identification of the birds of the McKinley region, P. A. Taverner's Birds of Western Canada is most useful. Through the kind permission of Mr. Taverner frequent reference has been made to the book in this publication.

In like manner, I am indebted to Dr. H. E. Anthony for permission to use information covering size, field marks, and range—particularly of small mammals—as given in his volume entitled "Field Book of North American Mammals."

It is regretted that there is no suitable single-volume botanical field book for the region. However, the National Park Service publications entitled "Plants of Glacier National Park", by Paul C. Standley, and "Plants of Rocky Mountain National Park", by Ruth E. Ashton, are small and inexpensive field books which are helpful in a study of the flora of the McKinley region.

Grateful appreciation is hereby extended to former Director Horace M. Albright of the National Park Service, to Assistant Director H. C. Bryant and the late George M. Wright of the National Park Service, and to Superintendent Harry J. Liek and the other members of the staff at Mount McKinley National Park for their assistance and encouragement.

Advice regarding the field studies and invaluable aid in identifying specimens through access to the zoological collections of the University of California were given by Dr. Joseph Grinnell, Director of the Museum of Vertebrate Zoology. Much help was obtained by permission to use the Alaska collections of the United States National Museum and the Bureau of Biological Survey. Gratitude is expressed to Mr. and Mrs. M. C. Edmunds of the Alaska Road Commission for further valuable assistance and advice in this project, and special acknowledgment is due to Mr. and Mrs. John E. Anderson for their excellent work in noting the earliest arrival and latest departure dates of various species during spring and fall migrations at Wonder Lake in the Mount McKinley region.

Specimens of birds and mammals collected by Charles Sheldon in this region have been donated to the United States Bureau of Biological Survey collections. Specimens collected by Mr. Wright and myself are in the Museum of Vertebrate Zoology of the University of California, and the Museum of Comparative Zoology of Harvard University. Specimens collected by me in 1932 are in the United States National Museum, the British Museum, and the Museum of Vertebrate Zoology.

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August 1934.

Geology of the Mount McKinley Region

NUMEROUS inquiries regarding the supposedly volcanic origin of Mount McKinley have come to my attention and I am led, therefore, to quote the following data from Bulletin 687 of the United States Geological Survey, The Kantishna Region, Alaska by Stephen R. Capps. On page 22 of this bulletin the following statement appears:

> Although the outermost range of foothills is composed dominantly of altered igneous rocks, the other foothill ranges and the main Alaska Range south of this region may be said to be composed primarily of material of sedimentary origin, with which are associated minor amounts of igneous material. The range is therefore the result of the folding and uplift of old sediments rather than a mountain mass formed by the injection of large quantities of molten intrusive rocks or by the upbuilding of a great mass of volcanic flows.

On page 71 of the same bulletin, when speaking of the origin of Mount McKinley, the author says:

> An important geologic event that occurred during the closing stages of the Mesozoic era or at the beginning of the Tertiary period was the uplift of a part of the Alaska Range, probably along its present axis. This movement was the first of a series of uplifts, that by their combined movements have given rise to the range that now contains the loftiest peak on the continent, Mount McKinley.

Climate of Mount McKinley National Park

SINCE Mount McKinley National Park includes both northern and southern slopes of the Alaska Range extremes in snowfall and precipitation are encountered in localities sometimes only 50 or 60 miles apart. One would expect that the snowfall would be heaviest on the northern slopes, but the reverse is the case. This is explained by the fact that the warm moisture-laden clouds sweep in from the Pacific Ocean and pile up along the seaward or south side of the lofty and frigid Alaska Range. The moisture is rapidly condensed resulting in a tremendous annual snowfall which at the higher elevations forms extensive glaciers. On the interior slopes the snowfall is comparatively light and the summers are relatively but not actually dry and warm. Thus Nucheck, in Prince William Sound, records a rainfall of 144 inches in 1 year, while on the interior side of the Alaska Range only 8 to 13 inches of rain, or about half of the yearly total,

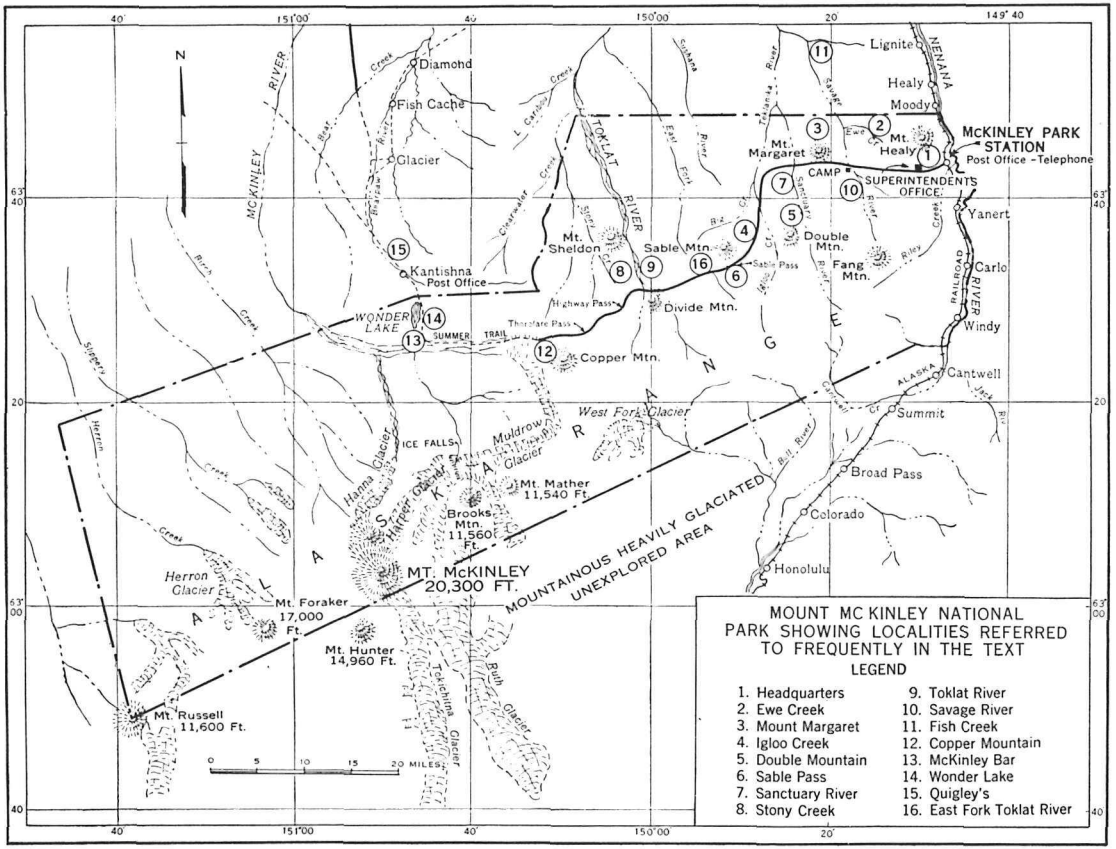

Figure 1.—MAP OF MOUNT MCKINLEY NATIONAL PARK.

falls during the summer; and the snowfall during the entire winter is 30 to 85 inches.

As a result of these conditions we have a reversal of the general rule which is that in northern latitudes animal life is more abundant on the southern than it is on the northern exposures. People visiting the park, therefore often show surprise when they find not only big game, but small animals as well, most numerous on the northern and supposedly unfavorable side of the Alaska Range.

Again, because of the atmospheric conditions, travel both by land and by air in this area is restricted at present almost entirely to the northern side of the Alaska Range during the summer travel season.

It so happened that a mild winter with relatively light snowfall was followed by an early, warm, and fairly dry summer in the McKinley region in 1926, while in 1932, the summer season, following the most severe winter in 40 years, was late, cold, and wet. I thus had an opportunity to experience both climatic extremes in my field work.

The self-recording minimum thermometer left near Browne's Tower, at about 15,000 feet, on Mount McKinley by the Stuck-Karstens party in 1913 was recovered by the Liek-Lindley expedition when they climbed the mountain in 1932. This spirit thermometer was calibrated down to 95° below zero and the lowest recorded temperature was below that point. Harry J. Liek took the thermometer back to Washington, D. C. where it was tested by the United States Weather Bureau and found to be accurate. The lowest temperature that it had recorded was found to be approximately 100° below zero.

Chief Clerk C. E. Richmond kindly supplied temperature records kept at park headquarters for several years, but the minimum daily temperature records obtained by Charles Sheldon at Toklat in 1907–8 (Sheldon, 1930, p. 394), are more typical of the major portion of the park, and they are given below.

Minimum daily temperature, above or below zero, at Toklat

1907

Highest		*Lowest*	
Oct. 26	+27	Oct. 31	−24
Nov. 14	+20	Nov. 5	−36
Dec. 10	+12	Dec. 14 to Jan. 19	−37

1908

Feb. 21	+27	Feb. 2	−19
Mar. 4	+28	Mar. 5–19	−41
Apr. 28	+32	Apr. 5	−16
May 21	+34	May 4	+15
June 3	+42	June 9	+23

119221°—38——2

Out in the park during certain winters the thermometer may drop to 65° below zero but it rarely stays as cold as that for any length of time. One of the longest "cool" spells Sheldon experienced on the Toklat came during the first week in November 1907, at which time the minimum daily temperature ranged from 26° to 36° below zero for a period of 7 days. Near Peters Glacier, at the north base of "Denali", Sheldon's records show that from December 26–31, 1907, the daily minimum temperature varied from 31° to 38° below zero. Contrasting with this, the daily minimum temperature dropped below zero at Toklat only during 14 days of the entire month of February 1908, whereas during the other days of the month the daily minimum ranged from 1° to 27° above zero.

The duration of the "summer season" in McKinley Park in 1932 was from June 14, when the last spring snowstorm left 6 inches of snow on the ground, to August 4, when the first fall snowstorm left several inches of snow on ridges down to the 4,000-foot contour line. At Wonder Lake, early in the morning of August 18, 1932, there was a thin sheet of ice about as thick as a window pane, over the nearby small ponds and along the margins of the creek.

Quoting from my field notes, the following account gives a fair impression of a typical summer day in Mount McKinley National Park.

Figure 2.—THE BEST VIEWS OF MOUNT MCKINLEY ARE TO BE HAD EARLY IN THE MORNING. "DENALI" AT 4 A. M. *Photograph taken August 17, 1932. W. L. D. No. 2840.*

SAVAGE RIVER, 2,800 FEET, JUNE 1, 1926.—Today broke clear as a bell. At 4 o'clock this morning the sun was shining brightly and snow-clad Mount McKinley from base to summit stood out against a deep blue sky in perfect snowy splendor (fig. 2). By 10 o'clock in the morning heavy storm clouds had drifted in from the southwest and by 10:30 o'clock both rain and hail began to fall with great violence. It rained hard at noon and again about 4 o'clock, but the clouds cleared off late that evening so that by midnight the sky was clear again.

In July 1932, it rained for days at a time in McKinley Park. The "damp" condition prevailing along the Alaska Range in summer which is produced by the rain results in the shrouding of the mountain in clouds. In 1926, out of a total of 72 days' field work, we had just 8 good views of "Denali", while in 1932, I had 14 good views of the mountain in the 110 days spent in the park. In the spring and fall visibility of the mountain is greater than it is in summer.

Faunal Position of Mount McKinley National Park

A LARGE PROPORTION of the breeding birds of the McKinley region consists of eastern forms. For instance, the robin, junco, and fox sparrow all belong to eastern and not to western races. Certain migratory species, such as Baird's sandpiper which breeds in the Kotzebue Sound region and along the Arctic Coast of Alaska, also breed high up in the mountain passes above timber line in the McKinley region. Yukon Valley races are fairly well represented in the park by both birds and mammals. In the case of certain small mammals the park seems to be a common meeting ground of several geographic races. In some instances we find typical northern Rocky Mountain forms, such as the Dawson red-backed mouse, living beside a typical western or Bering Sea form, such as the Nushagak ground squirrel. Two Asiatic forms, European wheatear and Kennicott's willow warbler, were found breeding in the region. Typical western species of birds, such as Hepburn's rosy finch and Gambel's sparrow, make up a rather small proportion of the total avifauna which was found, as previously stated, to consist chiefly of eastern and Arctic species, with some central Alaskan and a few western forms.

Life Zones

MOUNT MCKINLEY NATIONAL PARK can be divided readily into two life zones, the Alpine or Arctic and the Sub-Alpine or Hudsonian. Timber rarely is found growing in this region at elevations above 3,000 feet. The

higher or Arctic-Alpine zone of the park includes all areas above timber line. The treeless portion extends from the extreme summit of Mount McKinley (20,300 feet) down to timber line (3,000 feet). The main Alaska Range is all above timber line.

While there are many square miles of glaciers that have never been explored or even surveyed, we do know the extent of Muldrow Glacier on the northeast flank of Mount McKinley. It seems probable that this one glacier covers an area equal to the combined area of all the glaciers in Mount Rainier National Park.

After hiking some 750 miles in various portions of McKinley Park, it is my belief that considerably more than half of the park apparently lies within the Arctic-Alpine zone. This zone is the particular dwelling place and breeding ground of the following mammals: grizzly bear, Stone's caribou, Dall sheep, meadow mouse, Northern hoary marmot, and collared pika. The following birds are known to breed in the Arctic-Alpine zone in McKinley Park: long-tailed jaeger, Baird's sandpiper, Hudsonian curlew, Pacific golden plover, surfbird, Kellogg's ptarmigan, Kenai white-tailed ptarmigan, golden eagle, black gyrfalcon, short-eared owl, pallid horned lark, Northern raven, Hepburn's rosy finch, Eastern snow bunting, Alaska longspur, American pipit, and European wheatear.

Though the Hudsonian or Sub-Alpine life zone occupies about one-fourth of the total area of the park, it produces a much greater variety of animal life than is to be found in the higher, treeless Arctic-Alpine zone. The following species of birds were found inhabiting the Hudsonian life zone in the McKinley district: Alaska spruce grouse, Harlan's hawk, American hawk owl, Nelson's downy woodpecker, Alaska three-toed woodpecker, Northern flicker, Say's phoebe, olive-sided flycatcher, American magpie, Alaska jay, common redpoll, slate-colored junco, Eastern fox sparrow, Bohemian waxwing, Northwestern shrike, orange-crowned warbler, Alaska yellow warbler, myrtle warbler, Northern pileolated warbler, Yukon chickadee, Alaska chickadee, Hudsonian chickadee, Kennicott's willow warbler, Eastern ruby-crowned kinglet, Townsend's solitaire, gray-cheeked thrush, Eastern robin.

Among the mammals the following species were found to be characteristic inhabitants of the spruce woods and cottonwood groves of the Hudsonian zone: American black bear, Canadian beaver, Alaska marten, Alaska mink, Alaska moose, interior meadow mouse, Drummond meadow mouse, Alaska porcupine, Mackenzie varying hare, and Northern red squirrel.

Some adequate conception of life zone areas may be had from the fact that the entire mountain mass, from base to summit, lies within the

Arctic-Alpine zone. No other mountain of which we have knowledge is known to tower to so great a height as 17,000 feet above timber line.

Habitats

HABITATS of birds and mammals of Mount McKinley National Park may be segregated into two general groups according to the presence of moisture and general presence or lack of vegetation. Many square miles of glaciers and frost-riven rocks were found along the crest of the Alaska Range. Although glaciers contain a high percentage of water, this moisture remains frozen and consequently is not available for food production for either plant or animal life. It follows, therefore, that since Mount McKinley is blanketed deeply throughout the year with many feet of snow and ice (fig. 2) there is little animal life on the mountain proper. As a matter of fact, no bird or mammal life was found above 7,000 feet elevation save for an occasional transient eagle or gyrfalcon observed soaring over the rocky summits.

Figure 3.—ROCKY CLIFFS AND TALUS SUCH AS HERE SHOWN ARE THE HOMES OF THE COLLARED PIKA, NORTHERN HOARY MARMOT, AND DALL SHEEP. *Photograph taken June 6, 1926, Savage Canyon. M. V. Z. No. 5151.*

In the first group are the habitats characterized by little or no vegetation. These habitats are as follows:

1. Mountain summits, 7,000 to 20,300 feet altitude, covered with snow and ice throughout the year—devoid of animal life save for some soaring gyrfalcon or eagle.

2. Rocky ridges, 4,500 to 7,000 feet altitude, snow-covered for 9 months of the year but bare in summer time, except for creeping Arctic willows

Figure 4.—GRAVEL BARS EXTENDING AS ISLANDS BETWEEN MEANDERING BRANCHES OF THE RIVER ARE USED AS NEST SITES BY THE WANDERING TATTLER AND SHORT-BILLED GULL. *Photograph taken July 18, 1932, Toklat.* *W. L. D. No. 2772.*

and similar vegetation—the characteristic home of the Kenai white-tailed ptarmigan, American pipit, European wheatear, and Hepburn's rosy finch.

3. Talus slopes and rocky cliffs (fig. 3), 3,000 to 4,500 feet altitude—the characteristic home of the collatered pika, Northern hoary marmot, Dall sheep, and surfbird.

4. River gravel bars (fig. 4), 2,000 to 3,500 feet altitude—the breeding home of the wandering tattler, short-billed gull, and semipalmated plover.

In the second group are the habitats characterized by more vegetation. These habitats are as follows:

1. The shallow lake and pond (fig. 5), 2,000 to 4,000 feet altitude—the breeding ground of old-squaw duck, horned grebe, lesser scaup duck, and herring gull.

2. The wet "nigger-head" tundra and marsh, 2,000 to 4,000 feet altitude—the breeding ground of Hudsonian curlew and long-tailed jaeger.

3. The willow and alder thicket, 2,500 to 4,500 feet altitude—the breeding ground of the American magpie and Alaska ptarmigan.

Figure 5.—SHALLOW LAKES AT LOW ELEVATIONS ARE UTILIZED AS HOMES AND BREEDING GROUNDS BY CANADIAN BEAVERS, SCAUP DUCKS, AND HORNED GREBES. *Photograph taken June 13, 1932, Cathedral Mountain. W. L. D. No. 2598.*

4. The spruce woods (fig. 6), 1,000 to 3,000 feet altitude—the characteristic home of the Northern red squirrel, Alaska porcupine, Mackenzie varying hare, Alaska jay, Alaska chickadee, and Kennicott's willow warbler.

5. The Alpine meadow, 3,000 to 4,500 feet altitude, with its growth of grass and heather—breeding ground of the meadow mouse.

6. The dry tundra, 3,000 to 4,500 feet altitude—the breeding ground of Pacific golden plover, pallid horned lark, and Alaska longspur.

While the foregoing habitats are readily distinguishable, the elevations at which they occur vary considerably and the visitor to the park should not be surprised if a certain habitat is found above or below the elevations given here.

Fluctuations in Animal Populations

UNDER natural conditions in a primitive area such as Mount McKinley National Park there is a constant shifting of animal populations. The so-called "balance of nature" is fluctuating rather than static. For this reason the visitor who goes to the park should not be surprised if he finds individual birds or mammals of certain species more abundant or, as it may be, less numerous than previously reported by other observers.

Figure 6.—THIS AREA OF OPEN SPRUCE WOODS AND DWARF BIRCH THICKETS WAS THE HABITAT OF MACKENZIE VARYING HARES, ALASKA CHICKADEES, AND KENNICOTT'S WILLOW WARBLERS.
Photograph taken July 25, 1926, Savage River. M. V. Z. No. 5009.

For example, it is a matter of common knowledge that in the far north there are regular cyclic fluctuations of abundance in meadow mice, lemmings, and especially in the varying hares. In the case of the hares, data over a long period of years indicate that peaks of abundance occur about every 10 or 11 years with intervening periods of decreasing and increasing

Figure 7.—THE WINTER OF 1931–32 WAS SEVERE AND THE SPRING LATE; SNOW FELL TO A DEPTH OF 4 TO 6 INCHES ON JUNE 14. MANY SPECIES OF BIRDS, INCLUDING THE SURFBIRD, WERE ABSENT FROM LOCALITIES WHERE IN 1926 WE HAD FOUND THEM NESTING.
Photograph taken May 29, 1932, Savage River. *W. L. D. No. 2607.*

numbers. Following the increase in rabbits and mice, which have short periodic fluctuations, there is normally a gradual increase in predatory birds, such as owls, and mammals, such as Canada lynx. With the decrease or disappearance of rabbits, probably due to disease, the owls are forced to starve or move to other localities where food is available. Canada lynx are likewise reduced by failure of food supply.

In Mount McKinley National Park weather conditions may also be a contributing factor to such fluctuations of animal populations. As has been said, during our first season of field work an early spring and a warm dry summer were encountered. These conditions are believed to have contributed to the presence and breeding of such species as the Kennicott's willow warbler (*Acanthopneuste borealis kennicotti*) and the surfbird (*Aphriza virgata*), for in 1932 both of these species were absent from localities where previously they had been found breeding and had been seen regularly. As a matter of fact, in 1932, it would have been difficult for certain ground-nesting birds, such as the surfbird, to have nested and successfully reared broods of young, because of heavy, late spring snowstorms (fig. 7). On June 14, 1932, 4 to 6 inches of wet snow fell and lay for several days in a thick freezing blanket over the surfbird's and pipit's habitat. In 1926, no robins were found nesting on the ground under overhanging protecting banks, whereas in the same area, after the winter of heavy snows and prolonged cold weather, such ground nestings of robins were not unusual, especially in the latter part of the breeding season following the destruction by severe storms of unprotected nests in open willows.

The cyclic fluctuations in numbers of varying hares have been marked in McKinley Park. In the summer of 1926 these hares were abundant over all the wooded portions of the park that were visited. In certain favorable spruce woods, hares were estimated to average 3 or 4 to the acre, but over most wooded areas they averaged about 1 to the acre. The peak of abundance was apparently reached that season. By spring, the hares were so numerous that all young aspens and willows had been gnawed off and even a spruce tree that had blown over during a storm had been denuded of all foliage (fig. 8). With the abundance of these hares, hawk owls were coincidently abundant; however, repeated search both during the day and the night over these same areas in 1932, failed to reveal a single hare or hawk owl.

Charles Sheldon (1930, p. 120) states that mice of several species (*Microtus*, *Evotomys* and *Lemmus*) were incredibly abundant in 1907 in the Toklat region in McKinley National Park, so that "the surface was almost everywhere covered with mice . . . traps set on the [river] bars would in

Figure 8.—THIS WIND-THROWN SPRUCE WAS QUICKLY DENUDED OF FOLIAGE, AND EVEN OF BARK, BY NUMEROUS HUNGRY MACKENZIE VARYING HARES.
Photograph taken May 22, 1926, Savage River. *M. V. Z. No. 5004.*

less than half an hour contain a mouse, which, unless secured immediately, was eaten by others." Sheldon found that in 1908 mice were scarce and rabbits were at the periodical minimum—most of them having died. Dr. C. Hart Merriam states (Sheldon, 1930, p. 329): "In the case of the rabbit, the decrease is due to disease; in the case of the lynx, to starvation augmented by defective reproduction."

In 1926, we found meadow mice of three species and red-backed mice widespread and abundant in the McKinley district. On June 11 on the Savage River, at 2,800 feet elevation, meadow mice were so abundant in the open meadows bordering the river bars that many short-billed gulls were observed each morning and evening stalking and capturing half-grown meadow mice which are not very suspicious and which run about freely during the early and late hours of the day. By remaining motionless the gulls deftly picked up the mice as they sped along their runways. Careful counts of used burrows checked by actual sample trappings showed that in these favored localities there were at least 50 mice per acre present over considerable areas.

Figure 9.—THIS MEADOW, WHICH WAS TEEMING WITH TOKLAT RIVER VOLES ON MAY 30, 1926, WAS COVERED WITH 6 FEET OF SNOW WHEN REVISITED ON MAY 30, 1932, AND NO VOLES WERE PRESENT. *Photograph taken May 30, 1932, Savage River. W. L. D. No. 2767.*

As late as May 30, 1932, when I revisited this area, I found that most of it was still covered with a solid blanket of drifted snow from 4 to 6 feet thick (fig. 9). In late June when this meadow became free of snow I went over it again thoroughly but failed to find a single fresh mouse burrow or other "sign." In other localities in McKinley Park where we had found mice numerous in 1926, a thorough search in May and June 1932, showed that mice were either exceedingly scarce or entirely absent.

Estimates of numbers of birds and mammals are based upon recorded daily counts of individuals seen. Since most of the country is open tundra, visibility is good and an accurate count is therefore possible. In the case of the larger mammals such as caribou, grizzlies, red fox, and Dall sheep, certain routes covered in 1926 were repeated in 1932, care being taken to go over the identical routes and to count the mammals. As the same observer covered identical areas on nearly the same date of the month, it is believed that quite comparable counts were made. For some of the smaller mammals, systematic trapping was employed. In 1926, certain areas were se-

lected that were typical shrew and meadow-mouse habitats. Plots were laid out containing, by observation, average populations, and check plots nearby were also selected. On the first plots it was attempted, by intensive trapping, to capture all of the mammals in the particular area. This number trapped on a given area of known size was used as an index to estimate the number of individuals per acre. In the case of ground squirrels, pikas, and marmots, it was possible, with binoculars, to make a fairly accurate count of the population on a given area. In 1932 these same plots were again visited and checked by trapping or by counting as had been done 6 years previous.

Itineraries

DIXON AND WRIGHT, 1926

ON MAY 8, 1926, we departed from Seattle on the S. S. *Yukon* and reached Seward, Alaska, on the 16th. Transferring at this point to the Alaska Railroad, we arrived at McKinley Park station on May 18. A base camp in the park was made at 2,800 feet, on Savage River. Fortunately, we had the use of a cabin at this camp that had been built by the Alaska Road Commission. From this central locality various "pack-back" side trips were made on foot into some of the more remote sections of the park. During the 72 days, or 2½ months, spent in actual field work in the McKinley region we hiked approximately 500 miles, covering all portions of the park that are now normally visited by tourists. Our activities were divided as follows:

May 19–June 15	Savage River, 2,800 feet.
June 15–17	Sanctuary River, 2,900 feet.
June 19–23	Savage River, foothills.
June 24–29	Savage River, headwaters.
June 29–July 1	Savage River, 2,800 feet.
July 2–6	Fairbanks.
July 7–8	Savage River, 2,800 feet.
July 9	Igloo Creek.
July 10	Toklat River.
July 11–15	Copper Mountain.
July 16–19	Wonder Lake.
July 20	Copper Mountain.
July 21	Toklat to Igloo Creek.
July 22	Double Mountain.
July 26	Fish Creek.
July 23–29	Savage River, 2,800 feet.

We left McKinley Park station on July 30, departed from Seward for Seattle on August 1, and arrived in Berkeley on August 11.

DIXON, 1932

May 2	Left Berkeley, Calif.
May 7	Left Seattle.
May 15	Arrived McKinley Park Station.
May 16–23	Headquarters, Mount McKinley National Park.
May 24–27	Ewe Creek.
May 28–29	Savage River.
May 30	Mount Margaret.
June 1	Igloo Creek.
June 2–6	Savage River Canyon.
June 7–23	Igloo Creek and Double Mountain.
June 24–29	Park headquarters.
June 30	Sable Pass.
July 1–5	Park headquarters.
July 6–7	Igloo Creek.
July 8	Stony Creek.
July 9–14	Igloo Creek and Double Mountain.
July 15–18	Toklat.
July 19	Igloo Creek.
July 20	Sable Pass.
July 21–24	Igloo Creek.
July 25–31	Park headquarters.
August 1–2	Savage River.
August 3–5	Fish Creek.
August 6	Copper Mountain.
August 7	Muldrow Glacier.
August 8–9	McKinley Bar.
August 10	Wonder Lake.
August 11–12	Quigleys.
August 13	Wonder Lake.
August 14–23	McKinley Bar.
August 24	Copper Mountain.
August 25	Park headquarters.
August 26	Sable Mountain.
August 27	Toklat.
August 28–31	Park headquarters.
September 1	Left McKinley Park Station.
September 16	Arrived Berkeley, Calif.

Description of Localities

THE FOLLOWING descriptions of the localities of our main camps are given here in the general east or west order in which they are reached by ordinary travel from park headquarters out toward Mount McKinley and the Kantishna region. This is the regular summer travel route.

PARK HEADQUARTERS, 2,200 FEET.—Park headquarters are located 2 miles west of McKinley Park Station in a well-defined aspen and fireweed belt (fig. 10). Extensive groves of tall black spruce trees are to be found along Hines Creek near the headquarters. Certain birds, such as the olive-sided flycatcher, were found to breed at, but not above, this point, and several species of plants were found to reach their altitudinal limit here.

SAVAGE RIVER, 2,800 FEET.—Our camp was located about 1 mile above the upper end of Savage River Canyon. No cottonwood or spruce timber is present along the bed of Savage River at this point. However, the station was not above timber line, for we found that where small streams

Figure 10.—THIS ASPEN GROVE AT PARK HEADQUARTERS WAS THE FAVORITE HAUNT OF NELSON'S DOWNY WOODPECKER AND MARKED THE UPPER BREEDING LIMIT OF THE OLIVE-SIDED FLYCATCHER. *Photograph taken July 6, 1932. W. L. D. No. 2751.*

Figure 11.—DISTANT MOUNTAINS, TUNDRA PLAIN, AND AN OPEN FOREST OF BLACK SPRUCE IS A TYPICAL COMBINATION IN THE MCKINLEY REGION.
Photograph taken June 25, 1926, Savage River. *M. V. Z. No. 5261.*

emerged from the foothills and spread out, forming well-drained rocky alluvial fans, old established groves of black spruce trees, and an occasional black cottonwood growing along the stream bed, were characteristic features of the landscape (fig. 11). Back from the broad river bed, which is interlaced with shallow rocky channels filled with cold rushing streams, there extends toward the west for several miles the rolling treeless tundra (fig. 12). Toward the south, the barren snow-clad rocky summit of the main Alaska Range is visible.

Extending in a general east and west direction to the north of the camp was the north or secondary range. This "outside" range lies parallel to, but from 15 to 20 miles north of, the main range, and is the wintering ground of the mountain sheep of the region. This secondary range reaches an altitude of 6,000 feet, and its upper portions are precipitous and rocky. The drier middle slopes (fig. 13) are the favorite haunts of the surfbird and collared pika. These slopes are carpeted with *Dryas* and other lowly Alpine-Arctic plants. The lower slopes are clothed with thickets of dwarf birch (*Betula glandulosa*), and the streams are lined with willows of several species.

SAVAGE RIVER FOOTHILLS, 3,000 FEET.—Our second collecting station on Savage River was located just below timber line near the point where

Figure 12.—SEMIPALMATED PLOVERS NEST ON THE GRAVEL BARS WHILE HUDSONIAN CURLEWS AND LONG-TAILED JAEGERS BREED ON THE TREELESS TUNDRA RIDGES (RIGHT MIDDLE DISTANCE). *Photograph taken June 7, 1926, Savage River. M. V. Z. No. 5157.*

the Savage River emerges from the foothills of the main range. Here the river valley is narrow and flanked on either side by steep foothills, the rounded crests of which reach an elevation of 4,000 feet and are subject to sudden late spring snowstorms. The principal vegetative cover of the river valley at this elevation consists of extensive but rather open willow thickets. The open rocky gravel bars that extend continuously along the river (fig. 14) are the favorite nesting grounds of the semipalmated plover and wandering tattler. Kennicott's willow warblers and Hudsonian chickadees were encountered as characteristic inhabitants of the spruce woods near the camp, and colonies of interior meadow mice were found inhabiting a small wet meadow in the timber. In the willow thickets along the river varying hares and Alaska ptarmigan were found. Many broken and "horned" willow bushes showed that this was a favorite fall habitat of caribou about the time the bulls rub the velvet from their antlers.

Head of Savage River, 5,000 Feet.—Our base camp near the headwaters of Savage River was located at the old "caribou camp", but our field work was carried on chiefly on the barren slate ridges at the very headwaters of this stream. Here we found that we were in the center of the summer home of grizzly bears, mountain sheep, and caribou.

A few stunted willows and alders were found growing along the lower slopes up to 4,000 feet. Between 4,000 and 5,000 feet the steep barren mountain sides are covered with loose shale rock. Here deep snowdrifts in the ravines afford cool resting places for bands of caribou. Above 5,000 feet the stunted Arctic plants give way to barren rocky pinnacles with snow-filled rocky basins at their bases.

Igloo Creek, 2,900 Feet.—Igloo Creek camp was located near the upper margin of the spruce belt. This site is surrounded by mountains on three sides—Cathedral Mountain on the south, Double Mountain on the east, and Sable Mountain on the west. Several small shallow lakes and ponds in the region afford an excellent breeding ground for waterfowl such as horned grebes and lesser scaup ducks. These particular lakes and ponds also provide a favorite summer home for moose. Here they can escape the attacks of myriads of mosquitoes and flies.

Sable Pass, 4,000 Feet.—Sable Pass and the upper reaches of Igloo Creek are the favorite summer habitat of the grizzly bear. Often they may be found on hot summer days "cooling off" by sleeping on the snowbanks that fill the steep gulches of the mountain. Caribou also seek to escape the attacks of flies and mosquitoes by standing on or bedding down on these snowslides (fig. 15), where the winds tend to keep them free from insect attacks.

Figure 13.—THE SUMMITS OF THE SECONDARY RANGE REACH AN ALTITUDE OF MORE THAN 6,000 FEET. THE DRIER SLOPES IN THE FOREGROUND ARE FAVORITE HAUNTS OF THE SURFBIRD AND AMERICAN PIPIT. *Photograph taken May 30, 1932, Savage River. W. L. D. No. 3059.*

A favorite summer range for both caribou and grizzly bears are the dry Alpine ridges, toward East Fork Glacier, where Pacific golden plovers and Kellogg's ptarmigan also nest.

EAST FORK, TOKLAT, 3,000 FEET.—East Fork camp was situated on the edge of an extensive, barren, treeless gravel bar at the mouth of Coal Creek where the two main branches of East Fork unite. Here along the gravel bars short-billed gulls were conspicuously present.

TOKLAT, 2,900 FEET.—At the upper limit of good spruce timber our camp was made at the Toklat ranger cabin. This point is at the forks of the Toklat River and is within a quarter of a mile of Charles Sheldon's 1906 base camp. Our camp was about 2 miles above and across the river from the winter cabin which Sheldon built and where he lived during the winter of 1907–8. (See Sheldon, 1930, pp. 28 and 113 for detailed description.)

COPPER MOUNTAIN, 4,000 FEET.—Our Copper Mountain camp was located near the site of the present ranger cabin on the margin of a broad gravel bar which lies between the Muldrow Glacier and Thorofare River. This broad gravel flat along the river is covered with a mat of *Dryas* plants. Alder and willow thickets grow along the hillside streams. The whole Copper Mountain Basin is Alpine-Arctic, for it is well above timber line.

Figure 14.—THE OPEN, ROCKY GRAVEL BAR ON THE LEFT IS THE FAVORITE HAUNT OF WANDERING TATTLERS DURING NESTING TIME.
Photograph taken June 1, 1926, upper Savage River. *M. V. Z. No. 5155.*

Figure 15.—DRY ALPINE-ARCTIC RIDGES SUCH AS THESE ARE THE SUMMER HOME OF STONE'S CARIBOU AND GRIZZLY BEARS. PACIFIC GOLDEN PLOVERS AND PALLID HORNED LARKS NEST HERE. *Photograph taken June 8, 1932, head of Igloo Creek. W. L. D. No. 3058.*

McKinley Bar, 1,800 Feet.—At McKinley Bar we made our headquarters in the ranger cabin which is located in an extensive forest of spruce. This forest is known locally as "Big Timber", an apt description, since it is one of the heaviest stands of spruce in the park.

Wonder Lake, 1,900 Feet.—Wonder Lake, the largest lake thus far discovered within Mount McKinley National Park, lies in the depression between McKinley River and Moose Creek (fig. 16). It drains into Moose Creek; its inlet and outlet are located within a few yards of each other at its extreme northern end. The lake is 3 miles long, ½ a mile wide, and is 1,900 feet above sea level. Extensive open tundra areas are present at both ends of it, while spruce forests covering the hills on both sides extend down into its very waters. The south end of the lake is shallow and lined with grassy marshes forming an ideal nesting ground for several species of ducks which nest there regularly. The inlet stream and adjacent ponds at the head of the lake are the favorite home of several colonies of beavers. Each fall the low rolling tundra-covered hills are frequented by thousands of caribou. Lake trout, weighing as much as 22 pounds, have been reported taken in the clear blue waters of Wonder Lake.

Figure 16.—WONDER LAKE, THE ALASKA RANGE, INCLUDING MOUNT MCKINLEY MAY BE SEEN IN THE DISTANCE.
Photograph taken August 12, 1932, Wonder Lake. *W. L. D. No. 2847.*

BIRDS

CHECK LIST OF THE BIRDS

1. *Gavia adamsi* (Gray). Yellow-billed loon.
2. *Colymbus grisegena holboelli* (Reinhardt). Holboell's grebe.
3. *Colymbus auritus* Linnaeus. Horned grebe.
4. *Cygnus columbianus* (Ord). Whistling swan.
5. *Chen hyperborea hyperborea* (Pallas). Lesser snow goose.
6. *Anas platyrhynchos platyrhynchos* Linnaeus. Common mallard.
7. *Chaulelasmus streperus* (Linnaeus). Gadwall.
8. *Mareca americana* (Gmelin). Baldpate.
9. *Dafila acuta tzitzihoa* (Vieillot). American pintail.
10. *Nettion carolinense* (Gmelin). Green-winged teal.
11. *Nyroca marila* (Linnaeus). Greater scaup duck.
12. *Nyroca affinis* (Eyton). Lesser scaup duck.
13. *Charitonetta albeola* (Linnaeus). Bufflehead.
14. *Clangula hyemalis* (Linnaeus). Old-squaw.
15. *Histrionicus histrionicus pacificus* Brooks. Western harlequin duck.
16. *Melanitta deglandi* (Bonaparte). White-winged scoter.
17. *Melanitta perspicillata* (Linnaeus). Surf scoter.
18. *Astur atricapillus atricapillus* (Wilson). Eastern goshawk.
19. *Accipiter velox velox* (Wilson). Sharp-shinned hawk.
20. *Buteo borealis harlani* (Audubon). Harlan's hawk.
21. *Buteo swainsoni* Bonaparte. Swainson's hawk.
22. *Buteo lagopus s. johannis* (Gmelin). American rough-legged hawk.
23. *Aquila chrysaetos canadensis* (Linnaeus). Golden eagle.
24. *Haliaeetus leucocephalus alascanus* Townsend. Northern bald eagle.
25. *Circus hudsonius* (Linnaeus). Marsh hawk.
26. *Falco rusticolus obsoletus* Gmelin. Black gyrfalcon.
27. *Falco columbarius bendirei* Swann. Western pigeon hawk.
28. *Falco sparverius sparverius* Linnaeus. Eastern sparrow hawk.
29. *Canachites canadensis osgoodi* Bishop. Alaska spruce grouse.
30. *Lagopus lagopus alascensis* Swarth. Alaska ptarmigan.
31. *Lagopus rupestris kelloggae* Grinnell. Kellogg's ptarmigan.
32. *Lagopus leucurus peninsularis* Chapman. Kenai white-tailed ptarmigan
33. *Grus canadensis canadensis* (Linnaeus). Little brown crane.
34. *Charadrius semipalmatus* Bonaparte. Semipalmated plover.
35. *Pluvialis dominica fulva* (Gmelin). Pacific golden plover.
36. *Aphriza virgata* (Gmelin). Surfbird.
37. *Capella delicata* (Ord). Wilson's snipe.
38. *Phaeopus hudsonicus* (Latham). Hudsonian curlew.

39. *Bartramia longicauda* (Bechstein). Upland plover.
40. *Actitis macularia* (Linnaeus). Spotted sandpiper.
41. *Tringa solitaria cinnamomea* (Brewster). Western solitary sandpiper.
42. *Heteroscelus incanus* (Gmelin). Wandering tattler.
43. *Totanus flavipes* (Gmelin). Lesser yellow-legs.
44. *Pisobia bairdi* (Coues). Baird's sandpiper.
45. *Pelidna alpina sakhalina* (Vieillot). Red-backed sandpiper.
46. *Ereunetes maurii* Cabanis. Western sandpiper.
47. *Lobipes lobatus* (Linnaeus). Northern phalarope.
48. *Stercorarius longicaudus* Vieillot. Long-tailed jaeger.
49. *Larus argentatus smithsonianus* Coues. Herring gull.
50. *Larus canus brachyrhynchus* Richardson. Short-billed gull.
51. *Sterna paradisaea* Brünnich. Arctic tern.
52. *Bubo virginianus algistus* (Oberholser). Saint Michael horned owl.
53. *Nyctea nyctea* (Linnaeus). Snowy owl.
54. *Surnia ulula caparoch* (Müller). American hawk owl.
55. *Asio flammeus flammeus* (Pontoppidan). Short-eared owl.
56. *Cryptoglaux funerea richardsoni* (Bonaparte). Richardson's owl.
57. *Megaceryle alcyon caurina* (Grinnell). Western belted kingfisher.
58. *Colaptes auratus luteus* Bangs. Northern flicker.
59. *Dryobates villosus septentrionalis* (Nuttall). Northern hairy woodpecker.
60. *Dryobates pubescens nelsoni* Oberholser. Nelson's downy woodpecker.
61. *Picoides arcticus* (Swainson). Arctic three-toed woodpecker.
62. *Picoides tridactylus fasciatus* Baird. Alaska three-toed woodpecker.
63. *Sayornis saya saya* (Bonaparte). Say's phoebe.
64. *Myiochanes richardsoni richardsoni* (Swainson). Western wood pewee.
65. *Nuttallornis mesoleucus* (Lichtenstein). Olive-sided flycatcher.
66. *Otocoris alpestris arcticola* Oberholser. Pallid horned lark.
67. *Riparia riparia riparia* (Linnaeus). Bank swallow.
68. *Hirundo erythrogaster* Boddaert. Barn swallow.
69. *Perisoreus canadensis fumifrons* Ridgway. Alaska jay.
70. *Pica pica hudsonia* (Sabine). American magpie.
71. *Corvus corax principalis* Ridgway. Northern raven.
72. *Penthestes atricapillus turneri* (Ridgway). Yukon chickadee.
73. *Penthestes cinctus alascensis* (Prazak). Alaska chickadee.
74. *Penthestes hudsonicus hudsonicus* (Forster). Hudsonian chickadee.
75. *Certhia familiaris montana* Ridgway. Rocky Mountain creeper.
76. *Turdus migratorius migratorius* Linnaeus. Eastern robin.
77. *Ixoreus naevius meruloides* (Swainson). Northern varied thrush.
78. *Hylocichla guttata guttata* (Pallas). Alaska hermit thrush.

79. *Hylocichla ustulata swainsoni* (Tschudi). Olive-backed thrush.
80. *Hylocichla minima aliciae* (Baird). Gray-cheeked thrush.
81. *Oenanthe oenanthe oenanthe* (Linnaeus). European wheatear.
82. *Myadestes townsendi* (Audubon). Townsend's solitaire.
83. *Acanthopneuste borealis kennicotti* (Baird). Kennicott's willow warbler.
84. *Corthylio calendula calendula* (Linnaeus). Eastern ruby-crowned kinglet.
85. *Anthus spinoletta rubescens* (Tunstall). American pipit.
86. *Bombycilla garrula pallidiceps* Reichenow. Bohemian waxwing.
87. *Lanius borealis invictus* Grinnell. Northwestern shrike.
88. *Vermivora celata celata* (Say). Orange-crowned warbler.
89. *Dendroica aestiva rubiginosa* (Pallas). Alaska yellow warbler.
90. *Dendroica coronata* (Linnaeus). Myrtle warbler.
91. *Dendroica striata* (Forster). Black-poll warbler.
92. *Seiurus noveboracensis notabilis* Ridgway. Grinnell's waterthrush.
93. *Wilsonia pusilla pileolata* (Pallas). Northern pileolated warbler.
94. *Setophaga ruticilla* (Linnaeus). American redstart.
95. *Euphagus carolinus* (Müller). Rusty blackbird.
96. *Pinicola enucleator alascensis* Ridgway. Alaska pine grosbeak.
97. *Leucosticte tephrocotis littoralis* Baird. Hepburn's rosy finch.
98. *Acanthis linaria linaria* (Linnaeus). Common redpoll.
99. *Passerculus sandwichensis alaudinus* Bonaparte. Western Savannah sparrow.
100. *Junco hyemalis hyemalis* (Linnaeus). Slate-colored junco.
101. *Spizella arborea ochracea* Brewster. Western tree sparrow.
102. *Zonotrichia leucophrys gambeli* (Nuttall). Gambel's sparrow.
103. *Zonotrichia coronata* (Pallas). Golden-crowned sparrow.
104. *Passerella iliaca iliaca* (Merrem). Eastern fox sparrow.
105. *Melospiza lincolni lincolni* (Audubon). Lincoln's sparrow.
106. *Calcarius lapponicus alascensis* Ridgway. Alaska longspur.
107. *Plectrophenax nivalis nivalis* (Linnaeus). Eastern snow bunting.

HYPOTHETICAL LIST

1. *Mergus serrator* Linnaeus. Red-breasted merganser.
2. *Pedioecetes phasianellus phasianellus* (Linnaeus). Northern sharp-tailed grouse.
3. *Squatarola squatarola* (Linnaeus). Black-bellied plover.
4. *Petrochelidon albifrons albifrons* (Rafinesque). Northern cliff swallow.
5. *Cinclus mexicanus unicolor* Bonaparte. Dipper.

DESCRIPTIONS OF BIRD SPECIES

YELLOW-BILLED LOON

Gavia adamsi [GRAY]

GENERAL APPEARANCE.—An unusually large diving bird. The feet are fully webbed. The summer plumage is striking, with contrasting black and white patterns on the back. Length, 36 inches.

IDENTIFICATION.—Its unusually large size, the black and white color pattern, the ivory-white instead of black bill, are good distinctive characters for this bird.

DISTRIBUTION.—The breeding range and migration routes of the yellow-billed loon are imperfectly known. It is reported to breed on the tundra ponds along the northwest Arctic coast of Alaska.

HABITS.—When I was "frozen in" on the Arctic coast of Alaska near Demarcation Point, in 1913–14, I found yellow-billed loons inhabiting territory similar to portions of McKinley Park. Baird's sandpipers, which were breeding at Demarcation Point, were also found breeding in the high mountain passes of the park. It is doubtful whether the yellow-billed loon breeds in the McKinley district, but such a thing may be possible. We carefully examined the head and neck of a loon of this species that had been shot in the late fall by John Anderson at Wonder Lake. The ivory color of the bill and the nearly straight culmen showed plainly that the bird was a yellow-billed, and not a common, loon.

HOLBOELL'S GREBE

Colymbus grisegena holboelli [REINHARDT]

GENERAL APPEARANCE.—A large diving bird commonly known as "hell-diver." The feet are lobed but not fully webbed. The top of the head and the back of neck of the adults in summer is jet black. The cheeks are white. The neck is a rich reddish-chestnut. Length, 19 inches.

IDENTIFICATION.—The large size, reddish neck, and white cheeks contrasting with the dark area on the top of the head, are good identification marks.

DISTRIBUTION.—It breeds from northwestern Alaska and Siberia south to Washington and North Dakota. It is reported as occurring regularly in the park.

HABITS.—This species is said to inhabit the larger ponds and lakes in the Wonder Lake region, but it occurs sparingly and has not been noted in any numbers in the region. A specimen, flat skin, no. 50554, Museum of

Vertebrate Zoology, University of California, was collected at Wonder Lake on October 17, 1926, by John and Paula Anderson. The first spring arrival at Wonder Lake was noted by Mr. and Mrs. Anderson on June 3, 1927.

HORNED GREBE

Colymbus auritus [LINNAEUS]

GENERAL APPEARANCE.—A small diving bird about the size of a teal, with a slender neck and ear tufts. In summer this grebe has a rich chestnut neck and flanks with a broad connecting chestnut band along the side of the body. The top of the head, throat, and back are black. The ear tufts of feathers, behind the eyes, are ocher color, with a rusty stripe extending through and above the eye to the base of the bill, which is dark colored like the throat. Length, 13.5 inches.

IDENTIFICATION.—The large ruff, red neck, and light ocher ear tufts, as well as the slender narrow bill are all good field characters for this bird.

DISTRIBUTION.—The horned grebe is a northern species that breeds across

Figure 17.—THIS GRASS-RIMMED POND WAS THE BREEDING GROUND OF THE HORNED GREBE, A SPECIES NOT PREVIOUSLY KNOWN TO NEST WITHIN SEVERAL HUNDRED MILES OF THIS REGION. *Photograph taken July 9, 1932, Igloo Creek. W. L. D. No. 2602.*

the continent, from the northern Canadian provinces westward to Mount McKinley National Park, where it nests in small secluded grass-rimmed ponds.

HABITS.—This species was first noted near Igloo Creek, where I found a lone bird in a little grass-rimmed pond on June 14, 1932 (fig. 17). It was in company with a pair of lesser scaup ducks that nested there. On July 9, 1932, a family of horned grebes was found in another grassy pond on the old trail near Igloo ranger cabin. Two 24-hour-old downy young were colored as follows: back, head, black streaked with narow lines of white; belly, white; sides of head, neck, black with distinct white streaks, The nest in which these young grebes had been hatched was found to consist of a mass of dead sedge, moss, and other aquatic vegetation that had been piled up by the parent birds on an islet in a quiet grass-grown corner of the pond. This nest (fig. 18) still contained one infertile egg.

Each of the young streaked grebes hid by itself in the thick grass that grew all around the margin of this pond. They were watched over by both parents. Two pairs of short-billed gulls patrolled the pond daily,

Figure 18.—FLOATING NEST CONTAINING ONE EGG OF THE HORNED GREBE.
Photograph taken July 9, 1932, Igloo Creek. *W. L. D. No. 2601.*

but the young grebes were more than a match for the gulls. They would dive like a flash whenever a gull or magpie flew over the nest pond.

Later it was found that in the region about Wonder Lake many of the smaller grass-rimmed ponds sheltered a breeding pair of these grebes. Since this locality is several hundred miles west of the known breeding range of the species, a breeding pair of adults and two downy young were preserved as specimens.

WHISTLING SWAN

Cygnus columbianus [ORD]

GENERAL APPEARANCE.—A very large, all-white waterfowl with a long neck and an unfeathered tract between the eye and base of the bill. Length, 55 inches, or less.

IDENTIFICATION.—The all-white plumage and large size will serve to distinguish this swan from the snow geese and white pelicans. The only species that the whistling swan is likely to be confused with is the trumpeter swan, a much larger bird with a deeper, more sonorous call than the whistler. A yellow spot in front of the eye is characteristic of the whistling swan but is not invariably present.

DISTRIBUTION.—The whistling swan nests only in the far north, while the trumpeter breeds in southwestern Canada and the Yellowstone National Park region in the United States. The whistling swan passes through Mount McKinley Park on its annual migration to and from its nesting grounds in the Arctic regions of North America.

HABITS.—Since whistling swans stop over at Wonder Lake each spring and fall and are seen on other nearby lakes, it has been believed by some that these swans might nest in the McKinley region. However, they are present only during the spring and fall migrations and there are no summer or breeding records for the McKinley region, although seemingly suitable nesting ponds and conditions exist there. Mr. and Mrs. John E. Anderson reported that in the fall of 1928, the first swans, consisting of two adults and two young, arrived at Wonder Lake from the north on October 4. On October 5 there were 3 families—6 adults and 7 young—while on October 7, approximately 350 swans including some 200 young were counted. On October 8, only 50 adults and 20 young remained.

In the spring of 1929, the first swans (20) arrived at Wonder Lake at 2 p. m. on May 4.

This swan is a regular migrant through Mount McKinley National Park, but probably does not remain to breed.

LESSER SNOW GOOSE

Chen hyperborea hyperborea [PALLAS]

GENERAL APPEARANCE.—A snow-white goose of medium size, with conspicuous black-tipped wings, readily seen in birds that are in flight. Length, 23 inches.

IDENTIFICATION.—The snow-white plumage and black-tipped wings are the best field characters of this species and will distinguish snow geese from other geese.

DISTRIBUTION.—It breeds on the islands and mainland of Arctic North America and migrates through the McKinley region regularly each spring and fall.

HABITS.—Charles Sheldon reported three geese of this species seen on October 11, 1907, migrating south. These geese occur regularly in migration at Wonder Lake, where the Andersons reported their earliest spring arrival at 11 a. m. on May 14, 1927. The same observers reported that the first geese to fly south on the fall migration departed on September 5. 1928, and that again on September 10, a large flock flew south.

There is no evidence of the species breeding in the McKinley region.

COMMON MALLARD

Anas platyrhynchos platyrhynchos [LINNAEUS]

GENERAL APPEARANCE.—Our best known river duck. It is commonly known as "green-head"; the green head and white ring on the neck of the adult male are familiar to all. Length, 23 inches.

IDENTIFICATION.—The green head, the white ring on the neck, and recurved upper tail coverts of the male, as well as the tail which shows a general whiteness when birds of either sex are in flight, are good distinguishing marks.

DISTRIBUTION.—It is distributed throughout most of North America, breeding in Alaska, except in the far northern portion. It is a summer resident on larger ponds at lower elevations in McKinley Park.

HABITS.—The mallard is one of the common breeding ducks at Wonder Lake, where it was observed by us and where it has been noted to breed regularly. Mr. and Mrs. John E. Anderson reported that in 1927 the first flock of mallards observed, consisting of both males and females, arrived at 9 a. m. on May 10. In 1929, the first pair of mallards observed arrived at 8 p. m. on May 21. In 1928, the first fall migrants of this species, comprising a flock of about 50 birds, arrived at Wonder Lake at 3 p. m. on September 10. On September 16, 22, 24, 28, and 29, mallards continued

to arrive from the north. On October 6, the last mallard ducks left Wonder Lake on their southern migration.

Sheldon (1930, p. 400) reports that in 1907–8 about 300 mallards wintered along a 3-mile open stretch of the Toklat River (about 20 miles outside Mount McKinley National Park) and that they fed on dead salmon and salmon eggs.

GADWALL

Chaulelasmus streperus [LINNAEUS]

GENERAL APPEARANCE.—A streaked gray duck, somewhat smaller than a mallard, white below, without much detail. The female has much the color pattern of a female mallard but the barring is finer. Length, 19.5 inches.

IDENTIFICATION.—The large white color-patch or speculum and chestnut red upper wing coverts are distinctive in both sexes.

DISTRIBUTION.—It breeds in Alaska and in northern Canada, and in the McKinley district, near Wonder Lake.

HABITS.—This is one of the rarer species of ducks breeding in the McKinley region. Mr. and Mrs. John E. Anderson reported it as breeding regularly at Wonder Lake, where we found a pair on July 19, 1926.

BALDPATE

Mareca americana [GMELIN]

GENERAL APPEARANCE.—A chunky river duck of medium size. The adult males have a distinctive white cap. The females are broadly speckled, but both sexes show broad white patches on the fore part of the wing. Length, 19 inches.

IDENTIFICATION.—The white cap of the male and the white wing patches, which are especially notable in flight, are the best identification marks of this species.

DISTRIBUTION.—The baldpate breeds throughout the greater portion of Alaska. It was noted by us at Wonder Lake and on adjacent ponds between Wonder Lake and McKinley River.

HABITS.—This is one of the breeding ducks of the region, and breeding records should be watched for by people who visit the park during the summer months.

AMERICAN PINTAIL

Dafila acuta tzitzihoa [VIEILLOT]

GENERAL APPEARANCE.—A large, graceful duck with a slender neck.

The male has long projecting black central tail feathers, also a white stripe extending from the breast up either side of the neck. The female and juvenile males are similar to the female mallard but are of more slender build and the speculum on the wing is bronze. Length, 28 inches.

IDENTIFICATION.—The extreme slender build, "sprig" or "pin" tail of the adult male and the slender form and bronze speculum of juvenile males and females are diagnostic.

DISTRIBUTION.—It breeds throughout the northern portion of North America. I saw adults and young of this species at Wonder Lake on July 16, 1926, and again in 1932.

HABITS.—This species breeds on the larger ponds adjacent to the McKinley River. It has been found breeding at Wonder Lake and is said by residents to breed at various suitable localities in the park.

Mr. and Mrs. John E. Anderson reported the first spring arrival of a pair of pintails at Wonder Lake on May 20, 1929, at 3 p. m. On October 4, 1928, the same observers reported that 25 pintails on their southern migration rested on Wonder Lake for 2 hours.

GREEN-WINGED TEAL

Nettion carolinense [GMELIN]

GENERAL APPEARANCE.—The smallest duck found in the McKinley region. The male has a broad green stripe extending through the eye and along the side of the head. Both sexes have a brilliant green patch (speculum) on the wing. Length, 14.5 inches.

IDENTIFICATION.—The small size will distinguish this duck from all others that are known to occur in the McKinley region except the bufflehead. The lack of any white patch on the wing quickly distinguishes the teal from the bufflehead.

DISTRIBUTION.—It breeds across the continent, and is common throughout the Northwest. It is found breeding at Wonder Lake, and near Copper Mountain adjacent to Mount McKinley.

HABITS.—A family consisting of a mother and eight downy young was seen not far from the eastern boundary of the park on July 2, 1926. Another similar family was observed in a small beaver pond near Copper Mountain on July 19, 1926. The first spring arrivals were recorded at Wonder Lake on May 17, 1927, and were last seen there in the fall on September 24, 1928. The species is not abundant, but the vicinities named are regular breeding grounds for them.

GREATER SCAUP DUCK

Nyroca marila [LINNAEUS]

GENERAL APPEARANCE.—Scaup or bluebills are chunky ducks of medium size. The adult males at a distance appear black for the forward third of the body and white for the remainder. The adult females are white-bellied, brown ducks, with a conspicuous white spot on either side of the head at the base of the bill. Length, 18.5 inches.

IDENTIFICATION.—The best distinguishing mark between the greater and lesser scaup duck is found in the inner primaries, the outer webs of which are white in *marila*. This white area in the central portion of the forward part of the wing is lacking in *affinis*. The white spot at the base of the bill appears, on the average, to be larger in female *marila* than in *affinis* and the nail on the upper mandible is also larger and heavier in *marila*.

DISTRIBUTION.—The greater scaup breeds across the northern portion of North America in both Alaska and Canada. In McKinley Park all of the breeding bluebills that we found east of Sable Pass proved to be *affinis* and those that we saw breeding at Wonder Lake in the northwestern part of the park proved to be *marila*. Although we watched closely, no evidence of interbreeding was found, yet the two species were noted breeding within 50 miles of each other.

HABITS.—During August I found several families of greater scaup ducks in a series of small lakes and ponds in the foothills about Wonder Lake (fig. 19). These families consisted of adult females and small young birds from one-sixth to one-third grown. No adult males were to be found with the groups. On August 18, 1932, I collected an adult female and one of her brood of six downy young at Wonder Lake where several broods were present along the grassy margins of the southern part of the lake. These downy young were too small to have traveled over land from other smaller ponds in the region and probably had been hatched there.

This species proved to be one of the commoner regular breeding ducks of the northern portion of Mount McKinley National Park.

LESSER SCAUP DUCK

Nyroca affinis [EYTON]

GENERAL APPEARANCE.—A compactly built diving duck of medium size. Male scaups show a great deal of contrast in the color of the body, the forward half appearing black and the remainder, except the tail, white. Females are of a uniform dark brown color above with conspicuous white spots at either side of the base of the bill. Length, 16.5 inches.

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Figure 19.—TWO BROODS OF GREATER SCAUP DUCK WERE FOUND IN THIS ALPINE LAKE. IN THE BACKGROUND LIES THE ALASKA RANGE, MOUNT BROOKS SHOWING ABOVE THE CLOUDS TO THE LEFT. *Photograph taken August 17, 1932, Wonder Lake. W. L. D. No. 2597.*

IDENTIFICATION.—The lesser scaup male has a purplish instead of greenish reflection on the head found in the greater scaup, but this is difficult to distinguish except in a good light and at relatively close range. The most distinctive character between the two scaups in both sexes appears to be the color of the outer web of the inner primaries, this being white in the greater scaup and dark in the lesser scaup.

DISTRIBUTION.—It breeds in northern Canada and Alaska. It was encountered by us in the McKinley region on the Nenana and Sanctuary Rivers.

HABITS.—On June 13, 1926, at a lake near Healy Station on the Alaska Railroad, Mr. Wright observed a flock of 11 bluebills. On June 16, in a small lake about a quarter of a mile in length, near the Sanctuary River, we found 4 females and 1 adult male scaup resting and preening on a warm gravel beach. The male was taken for a specimen (J. D. No. 8790) and was found to be in full breeding vigor with testes three-fourths of an inch in length. It is our belief that these birds were nesting.

On June 14, 1932, a trio—a drake and two female lesser scaup ducks—was located in a small lake near the mouth of Igloo Creek. Courtship was then still in progress, and on June 23, when I again visited this lake, a family of six downy ducklings was swimming about with their mother near a protective fringe of grass. They disappeared and effectively hid in this grass when warned of our approach by their parent (fig. 5). On July 9, 1932, the ducklings were large enough to shift for themselves. An adult breeding female collected and preserved on that date has the small narrow "nail" on the upper mandible, and other characteristics of *affinis*.

Less than 50 miles away, at Wonder Lake, breeding females and downy young of *marila* were observed and collected on August 18, 1932. It would seem from my experience that both *marila* and *affinis* breed there, but that *affinis* is decidedly the earlier breeder of the two scaups in this region.

BUFFLEHEAD

Charitonetta albeola [LINNAEUS]

GENERAL APPEARANCE.—A diminutive duck, almost as small as a teal. The male is white beneath and around the base of the neck. The head and throat are black. He has a triangular puffy white patch on the side of the head behind and below the eye which extends completely across the hind neck. The female is blackish above and on the head, and white beneath, with a small triangular white patch behind the eye. The juvenile is similar to the female but the cheek mark is not as distinct. Length, 14.7 inches.

IDENTIFICATION.—The small size and the white patch on the cheek behind instead of in front of the eye, together with the white patch on the wing, distinguish this species from all other ducks of the region.

DISTRIBUTION.—It breeds over much of the northern portions of Canada and central Alaska and was found by us in the McKinley region on Savage River. It also breeds at Wonder Lake.

HABITS.—On July 27, 1926, at Fish Creek which is a tributary of Savage River, Wright observed two female buffleheads sailing downstream with their respective families of six and four young. Wright observed that one of the anxious mother buffleheads treaded water some 20 feet below a patch of overhanging willows that concealed her offspring. She coached them from the side line with anxious calls until he retired a few feet. Then the little fleet scurried forth to join its *admiral* in the downstream advance. Close observation failed to reveal the presence of any adult male buffleheads after the young were hatched, and it is our belief that the drakes leave the

nesting ground by the time the young are out of the shell. Where the food supply is meager, such a withdrawal leaves the entire food supply to the mothers and their downy young who need it most.

OLD-SQUAW

Clangula hyemalis [LINNAEUS]

GENERAL APPEARANCE.—A medium-sized, chunky duck, with contrasting plumage of black above and white below. The male has long central tail feathers like the male pintail. In summer the top of the head and the basal portion of the neck are white with a contrasting dark area behind the eye. The female is obscurely colored, with a general "burnt" color. It has a narrow whitish area which extends as a stripe behind and around the eye. Neither sex in any plumage has a speculum or white patch on the wing. Length, 21 inches.

IDENTIFICATION.—The chunky build distinguishes the male old-squaw from the male pintail, which is the only other duck in the region that has long central tail feathers. The female may be identified by her chunky build and the absence of any white patch on the wing. The call note, "Ahr-har-lek", is distinctive.

DISTRIBUTION.—It breeds on the tundra plains across northern North America, and was observed by us in the McKinley region near the Sanctuary and Savage Rivers.

HABITS.—On June 16, 1926, four mated pairs of old-squaw ducks were found inhabiting a small lake near the Sanctuary River. The males were not quite in full summer plumage and their call note, "Ahr-har-lek", was a little rusty and cut short at the end. On June 24, five old-squaws were seen by Wright on a little lake near Savage River. Nests were reported. A specimen (no. 50,555 in the Museum of Vertebrate Zoology) was collected October 17, 1926, by John E. Anderson at Wonder Lake. The earliest spring arrival noted was at 2 p. m., May 23, 1929, when three pairs of old-squaw ducks arrived at Wonder Lake. A family of eight ducks of this species that were hatched and grew up at Wonder Lake were last seen in the fall on October 6, 1928.

WESTERN HARLEQUIN DUCK

Histrionicus histrionicus pacificus [BROOKS]

GENERAL APPEARANCE.—A stocky duck of medium size and general dark coloration. The gaudily colored male, with its rich cinnamon underparts and bluish upper parts streaked with oddly placed bars of white, cannot be confused with any other duck. The female lacks any wing spot and is likely to be confused only with the female old-squaw. Length, 17 inches.

IDENTIFICATION.—The white crescent bar in front of the eye and on the side of the head, together with a white stripe across the neck and breast, distinguish the male. The female may be distinguished from the female old-squaw by dark instead of light underparts and flanks.

DISTRIBUTION.—It breeds on the northern Atlantic and Pacific coasts and in the interior of British Columbia. It was found by us along most of the glacial streams that flow out on the north side of the main Alaskan Range.

HABITS.—It is commonly encountered along the gravel bars of Savage River near the headquarters of the Mount McKinley Tourist & Transportation Co. (fig. 12). On May 22, 1926, at 2,800 feet elevation, I found a pair of harlequin ducks sunning themselves on a gravel bar under a warm, south-facing bank on Savage River. The brownish female always took wing first and led the male in flight. When alarmed these ducks flew upstream until they came to the first riffle, where they would alight and begin to feed by diving into the swift water, searching for living aquatic animal life under the smooth round stones that lined the river bed. Like the wandering tattlers, the harlequin ducks frequently and effectively escaped our notice while we passed, by crouching, motionless, in shallow water or on dark slate-colored gravel bars.

On May 28, 1926, I watched a pair of these ducks as they floated downstream. They usually dived together and reappeared from 20 to 50 yards below the point where they had gone down. Although I walked on down the stream at an average pace, the ducks outdistanced me. They disappeared down the stream and were out of sight in less than 5 minutes.

On June 2, a mated pair and two males in pursuit of another female were noted. By June 18, it became obvious that the female of the mated pair was incubating a set of eggs, for we saw her only occasionally, probably when she came off to feed, in the early morning or late evening. During the middle of the day the male harlequin hid out in the shady riffles resting or feeding. A male harlequin (J. D. no. 8,763) collected June 11, was in breeding condition with enlarged testes. Although the harlequin ducks were rather common, and though we spent many hours searching for their nests, they were so well secreted and the females so difficult to flush off these nests that we never succeeded in finding a single nest.

WHITE-WINGED SCOTER

Melanitta deglandi [BONAPARTE]

GENERAL APPEARANCE.—A large, dark, chunky sea duck, with a large white patch on the wing. Length, 22 inches.

IDENTIFICATION.—Birds of either sex may be recognized in any plumage by their large, dark, heavily built body and the large white patch on the wing.

DISTRIBUTION.—It breeds across the northern portion of North America. It has been observed at Wonder Lake.

HABITS.—Our record is based upon specimens obtained by Mr. and Mrs. John E. Anderson at Wonder Lake on October 17, 1926. One of these, which was preserved as a flat study skin, is now no. 50,556 in the bird collections of the Museum of Vertebrate Zoology of the University of California.

SURF SCOTER

Melanitta perspicillata [LINNAEUS]

GENERAL APPEARANCE.—A large, heavily built sea duck. The males are solid black except for a triangular white patch on the forehead and another on the back of the head and neck. The bill of the male surf scoter is highly-colored and swollen. The female is a uniform light brown with light patches on the cheeks below a dark cap. Length, 19 inches.

IDENTIFICATION.—Male surf scoters may easily be distinguished by the triangular white patches on the forehead and back of the head which give them their common name of "skunk-heads." The female is similar to the female American scoter but has more pronounced white cheek patches and the feathering extends farther down the top of the bill.

DISTRIBUTION.—It breeds across the northern portion of the continent. It was observed by us at Wonder Lake, Igloo Creek, and Copper Mountain.

HABITS.—At Wonder Lake, on July 19, 1926, from 50 to 75 surf scoters and their young were observed by us. On July 13, 1926, on the tundra near Muldrow Glacier, nine males and two females, all adult, were watched as they fed in a small pond. On August 18, 1932, I saw broods of six, seven, and eight downy young at Wonder Lake, where the first spring migrants arrived on June 11, 1927. This species is a regular breeder in the McKinley region.

EASTERN GOSHAWK

Astur atricapillus atricapillus [WILSON]

GENERAL APPEARANCE.—The largest of the short-winged hawks with a long narrow banded tail and short rounded wings. It is smaller than the red-tailed hawk. Length, 22 inches.

IDENTIFICATION.—The adults are almost all over light gray, finely vermic-

ulated with darker gray below. The juvenile birds are striped brown and white below. The long tail, and the short rounded wings that beat rapidly when the bird is in hurried flight are good distinguishing characters for this species.

DISTRIBUTION.—It breeds in the northern wooded sections across the continent. It is rare in McKinley Park and is confined to the lower timbered sections along the rivers.

HABITS.—On June 12, 1926, a bird of this species circled near us while we were examining a sheep lick on Ewe Creek, near the northern boundary of the park.

In 1932 an old nest of this hawk was found near McKinley Park Station. In this same locality a hawk of the species had been secured early in February 1932. This bird was saved as a specimen.

It is a rather rare resident in the lower aspen forested sections of the area (fig. 10).

SHARP-SHINNED HAWK

Accipiter velox velox [WILSON]

GENERAL APPEARANCE.—A small grayish short-winged hawk with a long, barred, square tail, and short rounded wings. Length, 11.2 inches.

IDENTIFICATION.—The round wings and the blue back of the adult "sharp-shin" are readily distinguished from the slender, pointed wings, and reddish back of the sparrow hawk.

DISTRIBUTION.—It nests in the coniferous forests of Alaska and Canada. It was observed in the McKinley region only as a migrant.

HABITS.—On August 17, 1932, near Wonder Lake, I shot and wounded a large female hawk of this species. However, the bird was only slightly hurt and after allowing me to approach within 6 feet of her, she suddenly regained enough strength to fly away as though uninjured. It is believed that this individual was a rare fall migrant from farther north since no hawks of this species had been seen in the Wonder Lake area in midsummer.

HARLAN'S HAWK

Buteo borealis harlani [AUDUBON]

GENERAL APPEARANCE.—A large dark-colored hawk of the red-tailed type with broad, long, rounded wings, and a short chunky body. The four outer wing feathers are notched.

It is a noisy hawk that sits on exposed perches or soars in wide circles out in the open. When the bird is in flight, the tail is usually carried spread out in a fan shape. And in soaring birds, the length—the distance from

the tip of the bill to the end of the tail—is less than half the spread of the outstretched wings. Length, 22 inches.

IDENTIFICATION.—The dark-colored tail, not white at the base, and heavy unfeathered tarsus (legs) distinguish Harlan's hawk from the American rough-legged hawk. Swainson's hawk is the only other large soaring hawk in the McKinley region and it has a decidedly smaller bill and more slender form than *harlani*.

DISTRIBUTION.—This species breeds in northwestern British Columbia, southwestern Yukon Territory, and in the adjoining parts of Alaska, at least as far west as Mount McKinley.

HABITS.—The Harlan's hawk is found in the McKinley region along the larger streams where trees of black cottonwood and spruce are found. Hawks of the species were first seen by us on May 24, 1926, in spruce timber near Savage River (fig. 6). On June 3, 1926, a pair of Harlan's hawks was found near this same place. They were perched in the very tops of large spruce trees and uttered the typical red-tailed hawk scream.

On July 19, 1926, a breeding pair of these birds was located at the south end of Wonder Lake. They were perched in a tall spruce beside their large bulky nest built of sticks. On July 27, George Wright collected an immature female Harlan's hawk, not long out of the nest, at Fish Creek on the lower Savage River. In 1932, a mated pair of Harlan's hawks was noted on June 4, 8, and 11, near the Igloo Creek cabin. *Harlani* is a regular breeding species in the Mount McKinley National Park.

All of the 15 hawks of the red-tailed type seen in the park both in 1926 and 1932 were of the dark *harlani* type; not a single light-colored bird was seen.

SWAINSON'S HAWK

Buteo swainsoni [BONAPARTE]

GENERAL APPEARANCE.—A soaring hawk with broad, rather pointed wings. It is slightly smaller than the red-tailed hawk with slenderer, bare legs but never with a red tail. In the Swainson's hawk only the three outer wing feathers are notched. There is great color variation in this species, ranging from a very light color on the under parts to almost black. Length, 20 inches.

IDENTIFICATION.—This species may be distinguished in the field from the rough-legged hawk by its lower legs which are bare, not feathered. The slender, lighter build and wing tips which are more pointed with only three notched primaries, instead of four, will distinguish it from the Harlan's hawk.

DISTRIBUTION.—It breeds from the Mount McKinley region, Fort Yukon, and Great Slave Lake south through British Columbia and Manitoba to northern Mexico. In the McKinley region we only encountered it at Wonder Lake.

HABITS.—The only record that we have of this species for the region is of an adult, dark-colored female collected August 8, 1932, at Wonder Lake, where it sometimes breeds.

AMERICAN ROUGH-LEGGED HAWK

Buteo lagopus s. johannis [GMELIN]

GENERAL APPEARANCE.—A large hawk about the size of the Harlan's hawk. Both light and dark phases occur in this species. The lower legs of the rough-legged hawk are feathered clear down to the base of the toes. When seen circling overhead, conspicuous white areas often show at the base of the tail and near the tip of each wing. Length, 22 inches.

IDENTIFICATION.—The white area at the base of the tail and on each wing, together with the fully feathered legs, distinguish it at once from all other large hawks of the region.

DISTRIBUTION.—It breeds from the Aleutian Islands along the Arctic coast of Alaska, to Victoria Island, Baffin Island, and Newfoundland. It was observed by us at the head of Savage River and at Copper Mountain.

HABITS.—We encountered this species first on June 18, 1926, near the head of Savage River. On that day, an American rough-legged hawk circled about a high cliff, returning several times. The white area at the base of the tail, with the terminal dark band, and the two other light areas, one near the tip of each wing, made identification easy.

On July 1, 1926, at Jenny Creek, five northern phalaropes were feeding busily in a small pond. They flew in precise military order upon our approach. Seeing the flying birds, a rough-legged hawk made a dart at one of the phalaropes but missed it and resumed his course low over the tundra. On July 10, 1926, another hawk of the species was observed hunting for mice along a grassy slope.

This hawk, like several other species, was not found in this same area in 1932. We therefore consider it an occasional rather than a regular summer visitor to the McKinley region.

GOLDEN EAGLE

Aquila chrysaetos canadensis [LINNAEUS]

GENERAL APPEARANCE.—The two largest hawklike birds found in the

McKinley region are the golden and northern bald eagles. In this area, any bird of prey 30 inches or more in length and having a spread of more than 6 feet from tip to tip of the wings may safely be called an eagle. Length, 30 inches.

IDENTIFICATION.—The large size and general dark brown coloration, together with the *long narrow wings;* the massive bill, which is nearly as long as the head, and the legs, which are feathered to the toes, are all good field characters of the golden eagle. Some of the birds of this species have golden or even cream-colored heads and a similar light-colored area at the base of the tail, but the entire head and tail is never pure uniform white as in the adult bald eagle.

DISTRIBUTION.—The golden eagle inhabits the northern part of the northern hemisphere. In North America it is rare east of the Mississippi River, but in the mountains of the west, from the Mexican boundary to northern Alaska, it is still found well represented in suitable localities. This is the common breeding species of eagle in the McKinley region where it is widely distributed and relatively abundant.

HABITS.—The huge eagle nests composed of large and small interlaced sticks are interesting and characteristic features of the park. These nests are usually placed on the cliffs in selected niches that have a warm, southern exposure. Each pair of eagles has a well defined territory, or hunting ground, which in the McKinley region was found to cover an average area of about 10 square miles.

Sheldon noted golden eagles which were active about their nests, in the spring, as early as April 8. At Toklat, he found eggs in an eagle's nest on April 29; when he visited the nest a month later, the eggs had hatched.

On June 12, 1932, at Double Mountain, I found an eagle's nest that contained two downy eaglets about 1 week old. On July 15, I visited the nest again and found that it was occupied by a single eaglet. In 40 years of experience in studying the nesting of golden eagles I have found that although two eaglets are usually hatched, in many instances only one grows up. From experience which I have had with captive downy eaglets, I am inclined to believe that in the lively battles over food one of the eaglets may be driven to the rim of the nest and may even fall entirely out of it. In most instances it has been the larger, older eaglet that disappears from the nest about the time that the flight feathers begin to make their appearance. Close observation at the eagle's nest in July showed that at this stage of development the eaglets spend considerable time standing at the edge of the nest flapping and exercising their growing wings which often became unmanageable in sudden gusts of wind. Twice I saw one

eaglet nearly blown out of the nest by an unexpected wind flurry. In each instance the bird saved itself by desperately clutching its talons into some solid stick that was tightly built into the nest. However, not all of the sticks forming the rim of a nest are solidly anchored and the finding of a dead eaglet and loose sticks at the base of the cliff below an eagle's nest leads us to believe that some of the more venturesome young fall from, or are blown out of, their nests by these sudden gusts of wind.

On July 17, 1926, we found that a pair of golden eaglets had just left their nest on a large cliff near the north end of Wonder Lake. This nest had been used regularly by a pair of eagles for several years.

At Stony Creek on July 11, we found an eagle's nest containing young. They could be heard calling a mile distant. The call of the golden eagle is not a scream, it is low pitched and resonant and carries a long way.

In the McKinley region the golden eagles depend primarily upon ground squirrels and hoary marmots for food. An incident observed on July 8, 1932, near the East Fork of the Toklat, suggests the possibility of foxes falling prey, at times, to the eagles. While we were returning from Stony Creek a very tattered adult red fox was observed crouching in the open beside the road; it was within a few feet of a galvanized iron culvert and was very loathe to run even when closely approached. At first we could not understand its tameness, but we were soon enlightened, for a golden eagle swooped down at the fox. A large male cross fox was found hiding nearby in the culvert. When we drove him out of it, he started off full speed down the open road, but he had gone less than a hundred yards when there was a sudden "hiss of wings" and the eagle shot down like a rocket and attempted to clasp the fox in its talons. The animal evaded the blow by jumping to one side just as the eagle struck. The moment the eagle attacked the second time, the fox fluffed out his tail and stuck it *straight up over his back*. It served as a protecting foil, attracting the eagle's blow so that the fox again escaped. The third attack of the eagle was frustrated by the fox diving into a narrow crack in the solid rock, under a large boulder, where we found him with just his nose sticking out. This fox was so fearful of the eagle that he allowed us to approach within 3 feet and even then we could not get him to risk the open again. Instead, he merely withdrew as far back as possible into the shallow, narrow crevice where we left him trembling, his eyes glowing like twin coals of fire.

Marmots are a favorite food of eagles. They proved to be the mammal most frequently brought to the young eagles in the nest that I watched at Double Mountain. On June 3, 1926, at Savage River, we watched a

golden eagle circling high over a fat old marmot that was cautiously sneaking back to its den by a series of alternating short rapid runs and hidings in thick vegetation. The mere appearance of a golden eagle about a marmot den brings forth a series of sharp explosive whistles which warn every mammal within hearing distance that danger is near.

On the afternoon of August 26, 1932, while stalking mountain sheep with the camera, I climbed up a jagged crest and surprised a golden eagle that was perched on a rocky summit eating a male Alaska ptarmigan which it had just captured. The eagle had carefully plucked the feathers off the ptarmigan before eating the bird. Another eagle was seen in hot pursuit of a ptarmigan. The ptarmigan's wings were going like an electric fan, while the eagle's wings flapped only at a moderate speed. The ptarmigan soon became exhausted and was forced to drop for safety into a willow thicket. Had the willows been absent at the critical moment, the eagle would have secured a toothsome meal.

We have been unable to obtain any authenticated instance of eagles killing young caribou. I have no direct evidence that eagles capture young mountain sheep but certain observations indicate that eagles might, at times, pick up a few unguarded lambs. On May 25, 1908, near Toklat, Charles Sheldon witnessed an attack which he describes (1930, p. 366–7) as follows: "While watching through my field glasses, a golden eagle suddenly came over the crest and with wings extended, made a swoop at the ewes, coming within 3 feet of them. They jerked up their heads, trying to strike the eagle with their horns. . . . After this attack the ewes, keeping the lambs directly under them, watched alertly for 5 minutes for the reappearance of the eagle. . . . After another 5 minutes the eagle came soaring from behind them. But they quickly saw it and stood over their lambs. The heads of the ewes were held stiffly up, tipped a little to one side, ready to hook at the eagle, should it come too close. As it passed 15 feet above them it swooped somewhat indifferently, and quickly rose. . . ." On June 7, 1908, Sheldon visited the eagle's nest at the forks of the Toklat and found "strips of skin and other remains of lambs" on the nearby rocks, showing that the eagle had been successful in his attack on sheep or had picked up carrion.

A careful study of four eagle nests all containing young was made in 1932, but I was never able to find any fresh remains of lambs in or below any of them. However, it should be stated that the lamb crop of 1932 was unusually poor. Sheldon states (1930, p. 383) that "after the lambs are over a month old they are seldom molested." Our experience in the region both in 1926 and in 1932 indicated that during these two seasons

lambs were rarely taken by eagles, which were found to live chiefly upon ground squirrels and marmots.

It should not be assumed that the eagle is always king of the air. On July 21, 1926, near the East Fork of the Toklat, I watched a gyrfalcon actually drive an eagle away from a cliff where both the eagle and the falcon nested. On July 13, 1926, at Copper Mountain, an adult short-billed gull was observed to drive an eagle away from a pond in which a downy young gull was paddling.

On August 23, 1932, at Igloo Creek, I watched three magpies take a ground squirrel away from a golden eagle. When first seen the eagle was standing on the ground eating the squirrel which it had just captured; as the three magpies flew by, they spied him. Two of the magpies then took turns swooping down at the eagle's head. The moment the eagle was forced to relinquish his hold on the squirrel in order to combat the attack of these two magpies, the third magpie slipped in and grabbed the squirrel, carrying it off while the eagle's attention was distracted. Later all three magpies feasted peacefully on the squirrel which they had stolen from the eagle.

One of the outstanding avian citizens of Mount McKinley National Park, the golden eagle should be preserved as an integral part of the native fauna.

NORTHERN BALD EAGLE

Haliaeetus leucocephalus alascanus [TOWNSEND]

GENERAL APPEARANCE.—A very large dark brown, hawklike bird. The adult has a conspicuous white head, neck, and tail. This conspicuous white is lacking in the immature bird which is entirely dark colored, save for various lighter mottlings. Length, 33 inches.

DISTRIBUTION.—They are found chiefly along the seacoast, or more rarely near large lakes, in the northern half of North America.

IDENTIFICATION.—Because of its large size and its white head, neck, and tail, the adult bird is unmistakable. Both adult and young birds have yellow feet and the tarsus, or lower leg, is bare—not feathered to the toes as is the tarsus of the golden eagle. Immature bald eagles lack the light spot near the under tip of the wing and the light band near the tip of the tail, both of which characters are often present in immature golden eagles.

HABITS.—The northern bald eagle is a rare straggler in the park. On May 15, 1932, near Windy, I saw an adult white-headed eagle flying up the Nenana River in the direction of Broad Pass and the south side of the Alaska Range.

MARSH HAWK

Circus hudsonius [LINNAEUS]

GENERAL APPEARANCE.—A meadow-haunting hawk of medium size with long wings, long tail, and partly feathered eye ring—suggestive of an owl. Length, 19 inches.

IDENTIFICATION.—The adult male is light gray above and white below with black wing tips. The female is like the young birds except that it is paler with less red. The juvenile is reddish brown striped with lighter brown below. Both sexes in all plumages may be readily recognized by a broad white band at the base of the tail.

DISTRIBUTION.—It is distributed throughout Canada and the United States.

HABITS.—On June 1, 1926, a hawk of this species was seen flying along Savage River well within the boundaries of the park. It is a rare breeder in the area—this was the only one seen during the entire summer. Sheldon reports that marsh hawks were common on the Toklat, on August 20–21, 1907, where they had been attracted by the abundance of mice.

BLACK GYRFALCON

Falco rusticolus obsoletus [GMELIN]

GENERAL APPEARANCE.—Largest of the true falcons, or "noble" hawks. In flight, falcons may be readily recognized by their long pointed wings and their direct bulletlike flight which is accomplished by quick strokes of the wings with relatively little sailing.

Another diagnostic feature of the falcons is the toothlike projection near the middle of each cutting edge of the upper half of the bill, which in all other hawks is sharp but even, not toothed.

Gyrfalcons vary greatly in color, some being almost pure white, others nearly black. All of the gyrfalcons that we observed in the McKinley region ranged from gray to very dark gray. Length, 22 inches.

IDENTIFICATION.—The long pointed wings, rapid wing beats, and large size are all good field characters for gyrfalcons in flight. As, in our experience, the birds were nearly always in flight when observed, these characters proved most useful.

DISTRIBUTION.—Gyrfalcons inhabit the Arctic regions of both hemispheres. In North America they are found from the Alaska peninsula north to Point Barrow and east to Labrador. In the McKinley region in 1926, breeding pairs were found in Savage River Canyon and at Wonder

Lake and Copper Mountain. In 1932, these same nesting sites were again visited and not a single gyrfalcon was present.

HABITS.—As previously indicated, gyrfalcons were nesting rather commonly in the McKinley region in 1926, when rabbits and ptarmigan were abundant. However, in 1932, when varying hares were at their periodic minimum and ptarmigan were just beginning to regain their former numbers, these large falcons were absent from their former nesting sites and not one bird of the species was seen during the entire summer. The pot holes in the cliffs, which had been used as nest sites, also showed that they had not nested there in 1931.

At Copper Mountain on July 20, 1926, we watched a family of four young gyrfalcons just out of the nest. They were flying about after their parents begging and calling loudly for food.

Another record of the presence of a pair of gyrfalcons in 1926 and their subsequent absence in 1932 was obtained from observations made in the Savage River Canyon. In 1926, a pair of gyrfalcons bred in this canyon and we watched them carrying ground squirrels and ptarmigan to their eyrie. During the summer of 1932, we visited the nest several times but the birds were absent.

It seems probable that the gyrfalcons have cycles of abundance, and the breeding birds move about over wide areas following closely upon the movements of rabbits, ptarmigan, and other small game upon which they subsist. In the future it will be interesting to check the years of abundance of rabbits and ptarmigans in the McKinley region and compare this abundance with the number of breeding pairs of gyrfalcons during the same period. It seems likely that the gyrfalcons will continue to be rare, or wanting, in the McKinley area until such time as the rabbits and ptarmigan again become plentiful.

WESTERN PIGEON HAWK

Falco columbarius bendirei [SWANN]

GENERAL APPEARANCE.—A small falcon, similar in size and coloration to the sharp-shinned hawk but with more pointed wings and shorter tail. The general appearance is that of a diminutive duck hawk. The back of the adult male is slate-blue and the tail is barred with the same color. The under parts are white or cream and more or less heavily streaked with ochre or brown. Both the back and the tail of the female and juvenile are brown and the under parts are cream, or deep buff, heavily streaked with dark brown. Length, 10 inches.

IDENTIFICATION.—The pigeon hawk is a true falcon, shown by the "toothed" bill and pointed wings. It lacks the red on the wings and tail of the sparrow hawk which is the only other small falcon in the McKinley region.

DISTRIBUTION.—According to the fourth edition of the American Ornithologists' Union "Check List of North American Birds", the Western pigeon hawk is the form breeding in northwestern Alaska, Yukon, and northwestern Mackenzie.

A specimen of a male just acquiring the blue feathers of the adult bird was collected by George M. Wright on May 25, 1926, at Savage River. This is now specimen no. 49705 M. V. Z. in the bird collection of the Museum of Vertebrate Zoology and Dr. Joseph Grinnell pronounced it as belonging clearly to the western form, namely, *Falco columbarius bendirei*.

Figure 20.—YOUNG PIGEON HAWK IN WHITE NATAL DOWN, WITH FLIGHT FEATHERS DEVELOPING ON WINGS AND TAIL.
Photograph taken July 9, 1932, Igloo Creek.
W. L. D. No. 2616.

HABITS.—Sheldon (1930, p. 401) states that he found the pigeon hawk a common summer resident and that it bred on the Toklat, and was first noted in the spring on May 27. On May 26, 1926, a family of three young Alaska jays were noted perched in the top of a dead spruce where they remained motionless and refused to fly as long as a pigeon hawk was present in that vicinity. Robins and other birds in the neighborhood uttered alarm and distress notes whenever the pigeon hawk appeared.

The crop contents of a family of young pigeon hawks, which were found and studied

at Igloo Creek, consisted chiefly of Gambel's and tree sparrows and other passerine birds.

On the morning of July 7, 1932, a pigeon hawk was heard calling repeatedly in a grove of spruce trees near an old igloo. There were no dead trees with suitable cavities for a falcon nest site in this grove, but I felt certain from the solicitude of the adult female bird that she had a nest there, and after much searching, five downy piegon hawks were located in a *magpie nest* in the thickly foliaged top of a spruce tree. These young falcons (fig. 20) were about half grown, with flight feathers emerging all along their wings and tails. The eyes of the young were bluish-black; the cere was greenish-yellow; and the feet were light yellow. These young falcons left the nest on July 11, as soon as they were able to climb about from branch to branch, but they remained in the top of the nest tree, or in other trees nearby, until July 23, at which time their flight feathers and wings were well enough developed so that they were able to fly about. They were never seen near the nest again.

The pigeon hawk nests regularly in the lower timbered areas in Mount McKinley National Park.

EASTERN SPARROW HAWK

Falco sparverius sparverius [LINNAEUS]

GENERAL APPEARANCE.—Smallest representative of the falcon family. It is the only small hawk in the McKinley region that shows bold black and white facial markings in both sexes. Other distinctive markings of this species are the red back and tail of the male and the general rusty color of the female. Length, 10 inches.

IDENTIFICATION.—The red back, bold black and white facial markings, small size, long pointed wings, and the habit of hovering stationary on rapidly beating wings are all good field characters.

DISTRIBUTION.—It ranges across North America north to the limit of the trees, and is found breeding sparingly in the McKinley region at a low elevation along the larger streams.

HABITS.—Our first acquaintance with this species in the McKinley region was on May 19, 1926, when Wright saw a brightly colored male at Savage River. In 1932, I saw the species twice: on August 1, when a male bird of the year was collected at McKinley Park Station, and on August 14, at Moose Creek, when another male was observed perched in a dead cottonwood. It is a rare but regular breeder in this region.

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ALASKA SPRUCE GROUSE

Canachites canadensis osgoodi [BISHOP]

GENERAL APPEARANCE.—A small, dark-colored grouse known locally as spruce grouse or "fool" hen. The male is black, gray and white with a small red eye comb. The female is barred all around the body with the above colors, but with a large admixture of rusty brown. Length, 15 inches.

IDENTIFICATION.—Good characters for distinguishing this species are the small size, the dark coloration, the general black and white color of the male and the brownish female strongly banded all around the body.

DISTRIBUTION.—It breeds in the interior of Alaska. In Mount McKinley Park, we found the Alaska spruce grouse was rare and restricted to the heaviest stands of spruce timber along the extreme northern boundary of the park.

HABITS.—The only individual of this species which we encountered in 1926 was an adult male (No. 8927 G. M. W.) which was discovered on July 27, at 1,600 feet elevation near the junction of Savage River and Fish Creek. It was on bare open ground amid the deepest part of the spruce forest. Park rangers reported that they usually see one or two spruce hens each year, but that they are always rare. Although especially sought for, John Anderson reported that he was able to find only *one* spruce grouse in 4 years (1926–30). However, the birds have increased. During the winter of 1931, the ranger stationed at the Kantishna Ranger Station, near Wonder Lake, reported them as being fairly common in the spruce woods there. At this same locality on August 8, 1932, I found a family consisting of a mother and her six nearly grown young, feeding in an open meadow beside a rambling brook, the course of which traversed the dense spruce woods. When alarmed, the mother flew up into a spruce tree and gave a series of warning, clucking notes. The young grouse flew in several directions perching in nearby spruce trees from whence they answered their mother's calls. All of these grouse sought shelter by perching well up in the trees under thick overhanging branches close to the main trunk where they were well hidden and extremely difficult to see.

From our observations and from data we have obtained, it seems that the periodic cycle of abundance in the spruce grouse occurs a season or two ahead of the peak of abundance in the willow ptarmigan. I am inclined to believe that the disease which produces a decrease in the numbers of the one may account for the periodic reduction in both species.

ALASKA PTARMIGAN

Lagopus lagopus alascensis [SWARTH]

GENERAL APPEARANCE.—A grouse slightly larger than the ruffed grouse of the eastern United States. It is white in winter; its general color is reddish brown in summer, with belly, legs, and flight feathers of wings white. The feet are feathered to the ends of the toes. It has an orange-red erectile comb over the eye which is especially noticeable in the male birds. The females are smaller and more somber colored than the males. Length, 15 inches.

IDENTIFICATION.—It is an Arctic grouse; throughout the year, its wing feathers are white and its tail feathers black When alarmed and flushed, the ptarmigan cocks fly up with rapid wing beats. As they fly off cackling hoarsely—sounds which remind one of an alarm clock running down—the white of their wings shows. During the summer, male ptarmigan, by their repeated crowing and cackling, often awaken park visitors at 1 or 2 o'clock in the morning.

DISTRIBUTION.—Ptarmigans breed in the northern parts of the northern hemisphere. The willow ptarmigan is the one species of ptarmigan to be encountered at lower elevations throughout the park, and individuals of this species are most numerous in willow thickets along streams. We found Savage River, just above the main transportation camp, an excellent place to discover and study them. This species is subject to great fluctuations in numbers from year to year. They may be abundant in a locality one season and almost entirely absent there after one or two unfavorable winters. Following a cyclic period of scarcity, ptarmigan were regaining their numbers in 1932.

HABITS.—The Alaska ptarmigan is an Arctic grouse which has the distinction of turning white in winter and brown in summer. The sight of this bird excites more interest on the part of the average visitor than any other bird in the park.

Since these birds do not occur in any of our other national parks, the opportunity to see and study them in Mount McKinley Park should not be overlooked. They may be found, if looked for, in willow thickets along the larger streams, and especially along the Savage and Sanctuary Rivers. The Alaska ptarmigan is primarily a bird of the lowlands and does not occur in any great numbers above timber line.

By early June, at which time visitors begin to arrive in the park, the male ptarmigan has already started to acquire its nuptial plumage. On May 24, at 6 o'clock in the evening, I heard a male ptarmigan "crow", and

looking out from camp, I saw what appeared to be a lump of snow on the flattened crown of a spruce tree about 200 yards distant. However, the binoculars revealed that this supposed lump of snow was in fact the white body of a male ptarmigan. The nuptial plumage of the male consists of chestnut feathers on the head and neck, with a few brownish feathers interspersed among the feathers of the back. Aside from these changes, the body feathers are still pure white. The male ptarmigan, as soon as he acquires his wedding garb (fig. 21) begins gradually to assume the brown summer dress, which is worn for only a few weeks, since it is soon necessary for him again to change into the pure white plumage which is worn by him during the entire winter. It will thus be seen that the male ptarmigan spends a goodly portion of his time and energy during the summer changing his clothes.

The female ptarmigan is not burdened by so many changes. She molts directly from the white winter coat into a brown house dress or working suit (fig. 22) which she wears during the entire summer. There seems to be a perfectly good reason for the somber garb and Quakerlike dress of the

Figure 21.—THE COCK ALASKA PTARMIGAN IN NUPTIAL PLUMAGE.
Photograph taken May 25, 1926, Savage River. M. V. Z. No. 5112.

female, because it is she who remains on the nest, incubating the eggs and protecting them from the prying eyes of numerous robbers. Later, this inconspicuous dress of the female is also very important when she is hovering and brooding her chicks.

By watching the male ptarmigan in the treetop we found that he was standing guard over his brooding mate, and, by waiting and watching, we discovered the hen ptarmigan when she slipped off her nest to feed. As soon as we started after the female, the male ptarmigan flew down from his perch and endeavored to decoy us away from her. The buffy brown hen fed hurriedly along, keeping in the depressions, with head, body, and tail all kept low to the ground. In contrast to this, the cock strutted about with neck and tail extended so as to attract as much attention as possible. We thought that by watching the hen we would be able to follow her back to her nest, but she eluded us. The next day we were on hand and had the privilege of witnessing the courtship of these very interesting birds. While the female was busily feeding, the cock ptarmigan spread his tail to the utmost, flexed his wings downward, and strutted in circles—just like a diminutive turkey gobbler—about his mate.

Figure 22.—THE MOTHER ALASKA PTARMIGAN IN HER BROWN SUMMER DRESS.
Photograph taken June 6, 1926, Savage River. *M. V. Z. No. 5130.*

On May 21 a ptarmigan's nest was located near the transportation company's main camp. This nest was placed in a bunch of brush, right out in the open. It was merely a depression wallowed out in the soft, reddish moss, which covered the ground at this point and was almost the exact color of the female ptarmigan. Brooding ptarmigan are notoriously tame and confiding. This particular female allowed us to take pictures of her on the nest at arm's length, and we finally reached out and gently stroked her back; even then she did not seem to be in the least disturbed.

Ordinarily the mother ptarmigan left her nest at 6 o'clock in the morning to secure a hasty breakfast which, by following her about, we found consisted of succulent green willow leaves and an occasional insect. While the hen ptarmigan was off her nest we took occasion to examine it and found that there were nine eggs (fig. 23) slightly smaller than those laid by a bantam hen. However, the ptarmigan eggs were irregularly marked with dark brownish—almost black—lines and splotches. After her hurried breakfast, the female ptarmigan waded out into a shallow stream, where she drank thirstily. The hen ptarmigan did not dare remain long off her nest, because there were numerous robbers in the form of long-tailed jaegers and short-billed gulls which made a regular practice of seeking for

Figure 23.—THE ALASKA PTARMIGAN'S NEST CONTAINED NINE EGGS.
Photograph taken June 1, 1926, Savage River. M. V. Z. No. 5148.

and destroying the eggs of other birds. The male ptarmigan does not abandon his mate, but seems to realize that his garb is so conspicuous that if he remains too near the nest he will betray his mate and endanger their treasures in the nest. Consequently he retires to a little thicket, about 50 yards from the nest, where he occupies a roosting place on the ground which is well screened and hidden from view.

The thieving gulls usually work in pairs or trios. We watched them daily as they flew about, keeping within 5 or 6 feet of the ground, searching for nests and eggs. One day, the gulls found the ptarmigan nest we had been watching. The fact that we had molested the nest may have aided the gulls in finding it. Having located the eggs, they would have made short shrift of them, had it not been for the watchful, brooding female. They could not rob the nest directly, but first one and then another of the gulls would swoop down and try to crowd the hen ptarmigan over to one side of it so as to expose an egg. The third gull would then swoop in and try to secure the prized morsel. However, as soon as the female ptarmigan saw the gulls approaching, she uttered a peculiar cry for help. The cock ptarmigan at once flew to her assistance and, by flying directly into and knocking down the gulls, soon drove them away. It was interesting and gratifying to see how easily the cock ptarmigan was able to drive off the gulls.

Figure 24.—THE EIGHT ALASKA PTARMIGAN CHICKS ARE DIFFICULT TO SEE, AS THE READER WILL FIND IF HE TRIES TO COUNT THEM.
Photograph taken June 15, 1926, Savage River. *M. V. Z. No. 5140.*

The period of incubation, in this particular instance, was found to be between 24 and 25 days. Even though the gulls knew where this ptarmigan nest was located, the eggs were not destroyed. Eight out of the nine eggs hatched. The downy young chicks of the ptarmigan were very sturdy. They were able to walk soon after hatching, so that the entire brood left the nest 3 hours after the first egg had hatched. In general appearance the chicks resembled diminutive turkey chicks, and being streaked with brown blended so well with the vegetation that it was often difficult to count them when they squatted in the grass (fig. 24) at only arm's length from us.

The mother ptarmigan brooded her chicks at regular and frequent intervals. She had a well-defined vocabulary which the chicks recognized and obeyed instantly. For example, when danger threatened, she uttered a warning note, a harsh "ke-ouk—ke-ouk." When the chicks were all safely brooded under her, she gave a soft, purring, "hush-a-bye" note which reminded us very much of that given by a domestic hen under similar circumstances. The cock was usually silent, but gave a hoarse, throaty "c-o-a-k", repeated several times in succession, whenever danger threatened.

The chicks were exceedingly active, running about, often leading their parents in their search for small insects and bugs, which were found to comprise more than 95 percent of their food.

The male ptarmigan accompanied his mate and helped in the care of the chicks, although he did not brood or hover them. The solicitude of the cock ptarmigan for his chicks is well known. We have been told of an instance in which a bull caribou had stumbled onto a ptarmigan brood and been put to flight by the onslaught of the enraged male ptarmigan. In another instance a large grizzly bear was reported to have been driven away from a brood of young ptarmigan in a similar manner. We were skeptical of such stories, until, on June 23, I came across a hen ptarmigan with her brood of small young. Wishing to make a close examination of one of the chicks, I rushed forward to grab one. Just as I reached over, a willow bush in front of me "exploded" and the male ptarmigan flew directly into my face, knocking my glasses to one side as he slapped my face with his beating wings. The bird then dropped to the ground, but returned immediately for a second attack, flying directly into my face. But this time I was ready for him, and succeeded in capturing him with my bare hands. I took the bird back to camp—which was nearby—photographed him, and then returned him to his family. Much to my surprise, when turned loose he wanted to fight again. I thought that such a valiant bird

Figure 25.—WE LEFT THE VALIANT MALE ALASKA PTARMIGAN IN FULL COMMAND OF THE FIELD. *Photograph taken June 6, 1926, Savage River. M. V. Z. No. 5117.*

should be perpetuated, and I therefore backed off and left him in command of the field (fig. 25).

KELLOGG'S PTARMIGAN

Lagopus rupestris kelloggae [GRINNELL]

GENERAL APPEARANCE.—A ptarmigan or Arctic grouse of medium size with a slim body and black tail feathers. In winter, white except for black tail and distinct black stripe extending from the base of the bill through and behind the eye. In summer, brown and grey with grey tones predominating; distinctly barred. The legs are feathered to the toes. Length, 13 inches.

IDENTIFICATION.—The Kellogg rock ptarmigan is smaller than the Alaska ptarmigan and larger than the white-tailed ptarmigan. The black tail separates it from the white-tailed ptarmigan at all seasons. In winter, the black stripe through the eye is distinctive. It may be distinguished from the Alaska ptarmigan in summer by the smaller size, proportionately smaller bill, greyer color, and a darkish spot in front of the eye.

DISTRIBUTION.—The rock ptarmigan is more Arctic in its distribution than either the Alaska or the white-tailed ptarmigan; it is found in northern North America and Greenland. In Mount McKinley National Park we found the summer home of this species to be the rocky shoulders of the mountain.

HABITS.—It was our experience, both in 1926 and in 1932, to find rock

ptarmigan in the summer breeding at middle altitudes in the McKinley region, usually around 4,000 feet elevations.

We saw this species first in 1926 on May 20, at an altitude of 3,800 feet, on a rocky ridge near Savage River. The male of the pair was decidely conspicuous, both on the brown tundra and on the gray granite rocks. At a distance, he appeared to be entirely white, especially as he stood on the crest of a ridge. We approached within 50 feet of the bird; then we could see that a few brown feathers were appearing on his head and neck. The female of this pair was much more completely in the brown summer plumage at the time. She remained well hidden in the dwarf alpine willows. We visited the pair again on May 26; the female was very nervous and kept up a continual "clucking"; at times, when closely approached, she gave a low warning "whine", which is quite different from the warning note of the female Alaska ptarmigan.

On May 27, 1926, we found a male ptarmigan standing guard on top of a rock pile, just above the refuge of two hoary marmots and a collared pika. It was our experience that there was a mutual advantage thus gained by these three species, since any one of the three upon sensing danger would sound an alarm. Although this alarm probably was intended only for their own kin, it was nevertheless a warning many times to the other species as well.

On June 24, 1926, two male rock ptarmigan were found hiding in a patch of dwarf willow high up on a rocky ridge near the head of Savage River. In 1932, I found that rock ptarmigan were entirely absent from the areas near Savage River where we had found them repeatedly in 1926.

On June 30, 1932, high up on the south side of Sable Pass, we found a male and two females feeding together. They were out in the open. The two females were in complete summer plumage while the male was still more than half white. The male kept trying to lead us away from the females. A pair of Pacific golden plover and two pairs of Baird's sandpipers were found near these rock ptarmigan; the breeding condition of the specimens which we collected indicated that all three species were nesting on the dry, gray rocky tundra nearby.

On July 8, 1932, at Stony Hill, in a high pass, two families of young rock ptarmigan, which were barely able to fly, were encountered feeding with their parents along the edge of the wet tundra. A downy male chick was collected.

In both 1926 and 1932 ten Alaska ptarmigan were seen to one rock ptarmigan. This, in our experience, is a fair expression of the relative abundance of these two species in the McKinley region.

KENAI WHITE-TAILED PTARMIGAN

Lagopus leucurus peninsularis [CHAPMAN]

GENERAL APPEARANCE.—A small grouselike bird. The toes are feathered to the base of the toenails. It is white all over in winter and is gray above and soiled white beneath in summer. Length, 12.5 inches.

IDENTIFICATION.—It is the smallest of the three species of ptarmigan. The tail feathers are white instead of black as are the tail feathers of the rock and of the Alaska ptarmigan.

DISTRIBUTION.—It breeds in the mountains of northern North America, both in Alaska and in Canada. In the park, we found these birds, during the summer months, high up on the mountain tops, at Copper Mountain and at the head of Savage River. When seen they were always on barren rocky ground near snowslides.

HABITS.—On June 27, 1926, while we were wading up an icy streamlet near the very headwaters of Savage River, Mr. Wright discovered a male white-tailed ptarmigan standing motionless on a snowslide within 15 feet of us. Realizing that he was discovered the ptarmigan ran across the snowslide, but as soon as he reached a gravel bar he stopped and again tried to hide by remaining motionless. The dark barring on the back of this bird blended so well with the surroundings that he was effectively concealed except when he stretched his neck in order to get a better view of the intruders. A few yards farther on we found another male bird of the same species, also near a snowslide. Neither of these cock white-tailed ptarmigan made any noise when alarmed, as do male rock and Alaska ptarmigan. They both tried to escape by running instead of by flying. One of the birds hid for a few minutes in the shadow of a rock.

On July 14, 1926, we climbed to the summit of one of the lower peaks near Copper Mountain. A short distance from the summit, at an elevation of 5,000 feet, we found a solitary male white-tailed ptarmigan amidst broken rock at a point well above the limit of plant life.

In 1932, not a single bird of the species could be found in the McKinley region although I hunted in many suitable places for them. It would seem that the species is rare in this vicinity, since during the nesting season of 1926 only 1 adult white-tailed ptarmigan was seen, to at least 100 Alaska and 10 Kellogg's ptarmigan.

LITTLE BROWN CRANE

Grus canadensis canadensis [LINNAEUS]

GENERAL APPEARANCE.—A large cranelike bird of dull, uniform brownish color with long legs and a long neck. It is without any plume or crest on

the head. The forehead and crown are covered with a thin growth of red hairlike feathers. Length, 35.5 inches.

IDENTIFICATION.—The rolling call note, the tall erect form, the red crown and, in flight, the long fully extended neck and legs are all good characters of this bird.

DISTRIBUTION.—The little brown crane belongs to a northern race breeding along the Arctic coasts of North America and Siberia.

HABITS.—Little brown cranes pass through the McKinley region each spring and fall. The earliest spring arrivals were noted at Wonder Lake on May 15, 1927, at 2 p. m., by Mr. and Mrs. John E. Anderson. The fall migration was recorded at Wonder Lake in 1928 as follows: September 1, first flock of 120 cranes were noted flying south at 3 p. m. September 2, at 6 p. m., approximately 300 cranes were flying south. The crane migration peak was reached on September 9, when about 4,000 cranes were seen—the flocks were flying south all day. On September 10, about 1,000 cranes were counted; the migration continued through the 13th and the 15th—approximately 500 being noted each day. The last flock of 28 cranes flew south over Wonder Lake at 2 p. m. on September 26.

In 1932, I noted the first fall migration on the evening of August 31, when I noted a flock of more than 200 little brown cranes flying eastward. The migrating cranes formed two rounded waving lines—the formation was not sharply V-shaped as it is in geese migrations. I could distinctly hear the loud rolling call notes of the clamoring cranes. This flight followed the first good snowstorm of the fall when the weather was clear but cold.

SEMIPALMATED PLOVER

Charadrius semipalmatus [BONAPARTE]

GENERAL APPEARANCE.—A very small plover, similar to the killdeer bu much smaller and having one, instead of two, black breast bands (fig. 26) It lacks the characteristic rust color of the killdeer's rump and tail. The legs and the base of the bill are warm yellow. The tip of the bill is black. The trim little body of this plover is white below and brownish-gray above. Length, 6.7 inches.

IDENTIFICATION.—The smaller size, single black breast band, and white forehead are sufficient to distinguish this species from all other wading birds which breed in the Mount McKinley district.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds across the Arctic and sub-Arctic portions of North America. In McKinley Park these birds are common summer residents along the

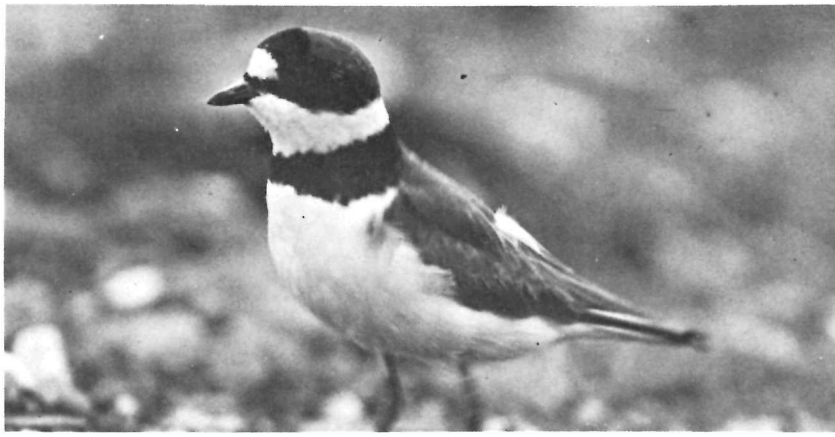

Figure 26.—THE SEMIPALMATED PLOVER HAS BUT ONE BLACK NECK BAND AND IS SMALLER THAN THE KILLDEER.
Photograph taken June 2, 1926, Savage River. *M. V. Z. No. 5079.*

gravel bars which are so characteristic of the larger rivers of the region.

HABITS.—Semipalmated plovers were first noted by us on May 21, 1926; a pair engaged in an ardent courtship was noted along a thawing gravel bar on Savage River. On this date, deep snowbanks still lay in many places on the river bars. On June 2, we found two plover nests on open gravel bars within 30 yards of Savage River. Both nests were on dry ground where the rocks were small and so numerous as to cover most of the surface of the ground. One nest was located beside a small pile of driftwood, while the other was located right amid the bare rocks (fig. 27) with only a few rootlets and small bits of driftwood to cushion the eggs from the hard rocks upon which they lay.

At first we supposed that the bird on the nest and the one most concerned about the safety of the eggs must be the female, but close observation proved that it was the male bird. The sexes in this species are said to have similar plumage and to be alike in external appearance. However, we found that on the nesting ground the male can be distinguished at close range, for he has a wide black band across the upper portion of his forehead; although the female has a similar band, it is narrower and browner than her mate's.

The male was flushed from the nest and in three out of four observed instances it was the male that was incubating the eggs. In nearly every case the bird on the nest would leave it while we were still 50 or 60 yards distant, and we found it advisable to retire to a greater distance and watch

Figure 27.—THIS NEST CONTAINING EGGS OF THE SEMIPALMATED PLOVER WAS FOUND OUT IN THE OPEN AMID THE BARE ROCKS.
Photograph taken June 2, 1926, Savage River. *M. V. Z. No. 5074.*

with binoculars, in order to locate the nest as the bird returned to resume the duties of incubation. When the male was flushed from the nest, in nearly every instance if we stayed near the nest he would return at once and, coming up to within 6 or 8 feet of us, would spread his wings and tail and crawl off along the ground as though badly injured. Sometimes he would lie flat on the ground and flap his wings as if in mortal agony. A plaintive cheeping accompanied this ruse, to attract our attention and to draw us away from the nest and eggs. If we remained stationary, he would crawl off a few feet and then look back over his shoulder to see if his ruse was successful. If we made any attempt to follow the bird, he would flutter along feebly until 50 or 60 yards distant from the nest. Then he would get up and run along until he had led us about 200 yards from it. Having thus decoyed us away, he would leave us behind and circle back to his nest. On June 6, when frightened from the nest, the male plover was very solicitous. Failing to decoy us away with his regular tactics, he circled around and ran by the nest to see if all was well, yet he never stopped near it, and he pretended not to see it at all.

On June 18, we found a pair of semipalmated plovers with a brood of 4 day-old downy chicks. Whenever we approached, the parents gave a warning cry to their chicks. Upon hearing this alarm note the youngsters, with one exception, crouched motionless and flat on the gravel with their heads and necks extended. Their gray fuzzy backs blended so well with the gray gravel upon which they lay that, as long as they remained motionless, we were able to find them only by the most diligent search. The one bold chick would not heed his father's command to hide, but kept running about along the water's edge picking up small insects and other bits of food. Even when we walked up to within 20 feet of him he made no attempt to hide but sought safety by running away. Seeing the danger that the chick was thus bringing upon himself, the father plover was almost beside himself with anxiety. When the young plover insisted on running about in spite of repeated warnings from his parent, his father flew directly at the chick, knocked it off its feet, rolling it over and over on the sand; then, when it refused to lie still, the parent pecked the unruly chick on the head until it stretched out its neck and remained still and motionless. However, this chick was a restless soul and would not stay quiet for more than a minute or two at a time. Soon, seeing no intimate threat of danger, he jumped up and started running about in search of food. The danger of such disobedience to his parent's warnings was better understood as we watched the numerous gulls and jaegers that were continually flying about over this territory, keeping a constant watch for such chicks, which they gobbled up whenever found.

This day-old plover chick was able to run about when he was only 12 hours out of the egg. When on land, the chick appeared to be largely feet and legs. Its feet were nearly as large as the feet of its parents and proved to be exceedingly useful, for by the aid of them the downy youngster was able to run tirelessly over the rough gravel as fast as a man could walk. In one instance we tried briskly to "walk" a day-old chick down and found that after 20 minutes the chick was still going much stronger than we were. The large feet also enabled this chick to walk over soft mud (fig. 28)—a bird with small feet would have gotten stuck in the mud. Then, too, we found that when he was cornered, he did not hesitate to strike out and swim boldly across a 10-foot channel of rough water. In the rough water the chick bobbed about like a cork but, with the aid of his large feet, he was able to swim against a fairly swift current.

On July 9 we found a family of four half-grown semipalmated plovers on the Sanctuary River. These young plovers ran ahead of us along the river bar and were able to run and dodge with great adroitness, so that it

Figure 28.—THE LARGE FEET OF THIS SEMIPALMATED PLOVER CHICK ENABLE IT TO WALK AND RUN SAFELY OVER SOFT MUD.
Photograph taken June 18, 1926, Savage River. *M. V. Z. No. 5088.*

was only with difficulty that we succeeded in capturing two of them. In the two specimens captured the natal down was replaced largely by the juvenile plumage.

We have been told by residents of the district that the plovers are among the earliest fall migrants to leave the McKinley region. The first arrivals from the south were noted at Wonder Lake by John and Paula Anderson, in the spring of 1929, on May 14. I found this plover just about as numerous in 1932 as in 1926. There appears to be little seasonal variation in this rather common species.

PACIFIC GOLDEN PLOVER

Pluvialis dominica fulva [GMELIN]

GENERAL APPEARANCE.—A typical wading bird about the size of a killdeer, but chunkier. In summer the throat, the chin, the top of the head and upper parts of the adults are black with a distinct white band extending across the forehead, and the back along the side of the head

above the eye and down the side of the neck. The back is speckled with numerous fine spots of golden yellow. Length, 10.5 inches.

IDENTIFICATION.—The golden flecking on the upper parts distinguishes the golden plover from the black-bellied plover, which is the only other species of plover with black under parts in Alaska. The short black bill distinguishes it from other plovers of the McKinley region.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds sparingly in the Mount McKinley region and along the Arctic Coast of Alaska. It was found by us at Copper Mountain on the Sanctuary-Savage River divide, and at Sable Pass.

HABITS.—On June 16, 1926, we encountered a pair of golden plovers on a barren gravel ridge near the summit of the Sanctuary-Savage River divide. They returned repeatedly to one locality, calling and showing great solicitude. The female of this pair was collected as a specimen and examination showed that she would have laid an egg within 5 or 6 days. Everything indicated that they would have nested right where we found them.

On July 11, we found two pairs of golden plovers in one of the mountain passes near Copper Mountain. One of these pairs of parent birds dragged over the tundra pretending to have broken wings; they gave every indication of having a brood of downy chicks nearby, but though we retired to a distance and watched with binoculars the chicks always eluded us.

On July 13, at Copper Mountain, a male golden plover kept up a continual outcry whenever we went near a certain patch of fireweed. It was obvious from his actions that there were young nearby but the parent was always on the alert and gave his offspring warning of our every move in their direction, thereby enabling them to hide even more surely and successfully.

At Sable Pass, on July 18, 1932, I found a pair of breeding golden plovers high up on a field of dry rocky tundra where, judging from their actions, the birds had small downy young hidden nearby.

We found about the same number of these plovers present in 1932 as were there in 1926, and we believe that the species is a rather rare though regular breeder in the McKinley region.

SURFBIRD

Aphriza virgata [GMELIN]

GENERAL APPEARANCE.—A shore bird, about the size of our common killdeer plover but chunkier. In summer it is brownish on the back and

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top of the head; the under parts are white, with triangular, bold, black markings; the feet are yellowish, and the bill is olive-colored. Length, 9.5 inches.

IDENTIFICATION.—The species may be recognized as a plump, grayish bird, with a white bar across the wing and a broad white patch at the base of the tail, which is conspicuous when the bird takes flight.

DISTRIBUTION.—It is distributed along the Pacific coast of North and South America. It breeds high up on the mountains of central Alaska. This bird may be looked for on bare, rocky ridges, well above timber line. It has been observed at the head of Savage River and at various places near the crest of the northern, or secondary, range. It is only a summer resident of the park, spending the winter in southern South America.

HABITS.—The surfbird was found by us nesting in the park in May 1926. The nest was discovered by George M. Wright on May 28. Previous to to this its nest and eggs were unknown, although the downy young had been collected above timber line in the mountains of interior Alaska. The nest was 1,000 feet above timber line, on a rocky ridge, with a south exposure, so that it and its surroundings were free from snow, although extensive snowbanks were found nearby.

The nest was placed in a slight natural depression, entirely out in the open, without the least concealment. It was within 12 inches of a well travelled trail of the Alaska mountain sheep. The nest was not fabricated; the eggs were deposited on a slight lining of dry leaves and a few bits of lichen and caribou moss. The four eggs were of a buff color and were well marked with bay-colored spots (fig. 29). The nest was discovered through Wright's flushing the male bird directly from the nest. Although we kept watch during the entire night and a part of the following day, we found that only the male bird incubated the eggs. During this entire time he did not leave unless we forced him off; then he returned and covered the eggs within a few minutes, seemingly realizing that if they were left for any length of time they would become chilled and would not hatch. When it began to snow and rain, the male bird merely fluffed out his feathers over the eggs, so that the moisture ran off and was absorbed by the mossy covering surrounding the nest.

During the entire time that we watched, no female surfbird put in an appearance. All of the males secured for specimens had bare patches on the lower portions of their breasts. Such incubation patches show conclusively that it is the male bird who attends to the domestic duties of the household. This seems to be especially certain since none of the females which we collected had any sign of incubation patches. Furthermore, the

Figure 29.—THE SURFBIRD'S NEST WITH ITS FOUR EGGS WAS FOUND IN A SLIGHT DEPRESSION ENTIRELY OUT IN THE OPEN.
Photograph taken May 29, 1926, McKinley region. *M. V. Z. No. 5210.*

females were all fat and in good flesh, whereas the males were uniformly lean or emaciated.

While we were watching the nest, a female mounain sheep appeared out of the mist and walked directly toward the surfbird nest. Just as she was about to step on it, the surfbird suddenly flew directly up into her face. The unexpected attack, the sudden noise, and the flash of white on the bird's wings and tail caused the startled sheep to jump back. By repeated observation and experiment, we found that this was the regular method that the surfbird employed to protect its eggs from being trampled on by numerous mountain sheep and caribou grazing daily all around the nest. Even when a person approached the nest, the bird would remain on it until the last moment and then, instead of sneaking off, would fly directly up into the intruder's face. Although we knew what to expect, we were always startled by the suddenness of the attack. After flushing it from the nest, the bird would run off a little way to one side, usually to a distance of about 10 feet. Here he would perch on a rock, fluffing out his feathers like a sitting hen, and uttering a low call, "tee-tee-teet!" The call would

Figure 30.—MALE SURFBIRD INSPECTING THE EGGS UPON RETURNING TO HIS NEST.
Photograph taken May 29, 1926, Mount McKinley district. *M. V. Z. No. 5213*

be repeated several times, with a slight pause between calls. If we started in pursuit of the bird, he would lead us carefully away from the nest, and then as soon as he had decoyed us away to a safe distance, he would fly directly back to the eggs. If, on the other hand, we remained at a distance and stood still, instead of approaching him, he would not bother to distract us further but would hustle back. In approaching the nest, the bird was very careful not to step on the eggs. He would run up to them and after inspecting them would reach out with his bill and turn them about (fig. 30); then he would squat at the edge of the nest, fluff out the feathers on his breast, and slide gently forward until the eggs were completely covered.

The summer diet of the surfbird was found to consist almost entirely of insects, which the bird captured by active chase among the bare, broken rocks. Thus, we found that the food of the surfbird in summer varied greatly from that which the bird obtains along the seashore in winter, when mollusks, barnacles, and other sea foods are eaten.

The surfbirds were usually encountered at the base of some rugged cliff which was often inhabited by mountain sheep (fig. 3). We also found that

Figure 31.—THE "SURFBIRD" PLANT, *Dryas octopetala*, IN FLOWER. *Photograph taken June 17, 1926, Savage River. M. V. Z. No. 4993.*

the surfbirds were closely associated with a small, white-blossomed plant, *Dryas octopetala* (fig. 31), which grew abundantly along the slopes just above timber line.

During the entire 72 days which we spent in the park, in 1926, we encountered surfbirds only seven times, and many days were spent in good territory in search of them without discovering a single bird. May 30, 1932, I found that due to the heavy snowfalls during a long hard winter, snowbanks several feet thick still covered much of the area where we had found surfbirds regularly during the latter part of May 1926. Snow conditions and fresh falls of snow continued through the early summer—as much as 6 inches of snow falling at 4,000 feet on June 16, 1932, in the typical surfbird habitat. Although repeated visits were made to the identical places where we had found these birds regularly present in 1926, possibly as a result of this unusual snow condition, not a single surfbird could be found in the entire area. The severe late spring snowstorms, occurring as they did, made it difficult for surfbirds to nest successfully in this area. It is our opinion that in 1932 these birds nested at lower elevations farther in the

interior where the snowfall was less and spring came much earlier than it did in Mount McKinley National Park.

Our experience would indicate that during favorable, early, warm summers, surfbirds nest in limited numbers in McKinley Park but that during late, cold summers they may be absent there.

There are many hundreds of square miles of territory along the northern, or interior, slope of the Alaska Range in the McKinley district which are suitable for surfbirds during the breeding season. It is therefore reasonable to believe that there are isolated pairs of nesting surfbirds scattered at intervals over this territory.

For a detailed account of this discovery, see The Surfbird's Secret by Joseph S. Dixon, published in *The Condor*, Vol. XXIX, pp. 3–16, January 1927.

WILSON'S SNIPE

Capella delicata, [ORD]

GENERAL APPEARANCE.—A medium sized, brown, meadow inhabiting bird. It has a large dark eye and a boldly streaked head. Its long slender flexible bill is slightly enlarged and is sensitive at the tip. Length, 11.2 inches.

IDENTIFICATION.—The long bill, the reddish tail, the corkscrew flight leading to and from its wet meadow habitat; its harsh rasping alarm note—these are all good field characters for this bird.

DISTRIBUTION.—It breeds across the continent in suitable wet meadow habitat. In the McKinley region it is found in wet meadows along the larger rivers.

HABITS.—The Wilson's or Jack snipe is an excellent example of concealing coloration. So well does its plumage blend with the surrounding vegetation that the bird may be almost stepped on before being seen. The first spring arrival of this species was noted as early as May 14. Late in June 1932, a nest and four eggs of the Wilson's snipe were discovered by a ranger near Igloo Creek. The bird is a rather common but inconspicuous summer resident in the McKinley region.

HUDSONIAN CURLEW

Phaeopus hudsonicus [LATHAM]

GENERAL APPEARANCE.—A very large shore bird of general buff color, with a long, curved bill. It is faded brown above mixed with buffy below, and it has a decided light stripe running from the base of the bill along the side of the head above and behind the eye. Length, 17 inches.

Figure 32.—THE HUDSONIAN CURLEW IS A LARGE GRAYISH BROWN BIRD WITH A LONG CURVED BILL AND A WHITE STRIPE ON THE SIDE OF THE HEAD ABOVE THE EYE.
Photograph taken July 13, 1926, Copper Mountain. *M. V. Z. No. 4977.*

IDENTIFICATION.—The long curved bill, the large size, brownish color, whitish stripe on the side of the head (fig. 32), and the loud, nerve-racking cries of the birds when their home territory is invaded, all serve to distinguish this species.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds in northwestern Alaska and in northern Canada; and it is found breeding in fair numbers on wet tundra areas in the higher passes of the Mount McKinley region between Savage River and Copper Mountain.

HABITS.—On June 16, 1926, we found three breeding pairs of Hudsonian curlews on a wet meadow on the divide between the Sanctuary and Savage Rivers. Nesting in the same meadow were two pairs of long-tailed jaegers. In several other places we found these two species closely associated during the nesting season. The curlews are excellent watchmen and detect an intruder while he is yet a long way off. They inform the entire neighborhood, by their outcry, whenever they see danger in any form approaching. On the other hand, the jaegers act as a police patrol and drive away any caribou, gull, or other intruder which they find invading the common nesting ground. There appears to be no friction between the jaegers and the curlews and our own experience confirmed the statements of persons

who live in the region, namely, that the Hudsonian curlews and long-tailed jaegers in this region are always found nesting near each other on boggy patches of wet tundra. An adult female (No. 8789 J. D.) in breeding condition was collected by us on June 16, and on June 24 another female (No. 11 G. M. W.) with well-marked incubation patches on her breast was collected by Mr. Wright.

On July 13, at Muldrow Glacier near Copper Mountain, a female Hudsonian curlew with chicks about the size of a spotted sandpiper, kept trying to decoy us away from her offspring by spreading her tail and wing and then sneaking off through the fireweeds as if crippled. Although we saw the young curlews several times, they always eluded capture by cleverly concealing themselves in clumps of this fireweed. We watched the parent curlew as it fed amid the blossoming plants and found that, instead of foraging along the water's edge, as we had expected, the bird stalked and captured large bumble bees that visited certain large purple-red blossoms. At first we could scarcely believe our eyes when we watched with binoculars and saw a curlew slip up and deftly pick insects out of the flowers. The birds held the larger flies and bees in the tip of their bills; then before swallowing the insects they banged them against the ground until they were killed and broken. The smaller insects were gulped down whole as captured and without ceremony.

In 1927, the first curlews were seen at Wonder Lake on May 11, at 2 p. m. There were about 50 birds in the flock. In 1932, curlews were found in about the same numbers and at the same places that they were found in 1926. These birds occur commonly and are regular breeders in the McKinley region.

UPLAND PLOVER

Bartramia longicauda [BECHSTEIN]

GENERAL APPEARANCE.—A buff-colored wading bird slightly larger than a killdeer. The bill is short, about the length of the head. Length, 11.5 inches.

IDENTIFICATION.—The Hudsonian curlew is the only bird in McKinley Park which is liable to be confused with the upland plover. They are sometimes found near each other, but the upland plover has a short bill and is decidedly smaller than the curlew; and the upland plover has a habit of alighting in treetops, which we have never known the curlew to do.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds from Oregon north to northwestern Alaska. In McKinley Park

they were found by us on the McKinley River bar, below Muldrow Glacier, and in Polychrome Pass. This species is partial to the drier meadows and gravel bars.

HABITS.—On July 16, 1926, on an open gravel bar beside McKinley River, we saw a bird which at first sight we took to be a curlew, because of the manner in which it hurried out to greet us. The excited call notes of the bird were also very curlewlike, but this bird perched in the top of a dead cottonwood, which was not characteristic of the curlew. By the aid of the binoculars we could see that the bill of the bird was short and straight, not long and curved downward at the tip, as is the curlew's bill. The side of the bird's head was a light tan color which, together with the large dark eye, gave the bird a 'ghostlike appearance. In flight, the bird flapped its wings rapidly and then soared on set piñons, just as does the male mourning dove during the mating season.

Three pairs, all apparently breeding, were encountered between Muldrow Glacier and Wonder Lake. Mr. and Mrs. John E. Anderson collected the eggs and a parent bird of this species and sent them to the Museum of Vertebrate Zoology.

On July 21, 1926, in Polychrome Pass, we found a pair of upland plovers fluttering about. They were trying with their cries and contortions to distract our attention from the young which were dodging about in the grass eluding capture.

On July 16, 1932, I found several pairs of upland plovers along the Toklat River upon the open flats, near Charles Sheldon's old cabin. Sheldon's experience and our own observations indicate that the upland plover breeds regularly, though in rather limited numbers, in the McKinley region.

SPOTTED SANDPIPER

Actitis macularia [LINNAEUS]

GENERAL APPEARANCE.—A typical wading bird about the size of a robin. The upper surface, including the tail, is olive brown with a faint greenish lustre. The under parts of the body are white, sprinkled everywhere with rounded brownish black spots. Length, 7.5 inches.

IDENTIFICATION.—The small size, the conspicuous round blackish spots on its white breast and its habit of teetering at frequent intervals—these are all characters and habits which distinguish the species.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds over most of northern North America, and it is found in McKinley Park breeding on Savage River at 2,800 feet elevation. It is not common in the park.

HABITS.—On June 3, 1926, Wright watched 5 spotted sandpipers which were busy at love-making. He recorded that a male passing or catching up with a feeding female would hover 10 to 15 feet above and directly over her and then drop slowly to the ground beside her, only for her to lead him a merry chase by running off ahead of him. At other times the male would fly away for a few feet, then alight and strut back to the female with his breast feathers puffed out and his wings slightly drooped. These courtship displays were accompanied by a series of frequently repeated notes, "tśweet, tśweet, tsnet, tśne." On June 24, 1926, near this same spot Mr. Wright found a nest of the spotted sandpiper containing three well-incubated eggs. The parent bird returned to the nest as soon as Mr. Wright hid at a distance. During the next hour the same bird returned to the nest several times and was flushed from it several times. When collected, just as it left the nest, this bird proved to be the male and not the female.

WESTERN SOLITARY SANDPIPER

Tringa solitaria cinnamomea [BREWSTER]

GENERAL APPEARANCE.—A dark slender wader, slightly larger than the common spotted sandpiper. The bill is slender and slightly longer than the bird's head. The wings are black. The long slender toes and legs are olive green. Length, 8.4 inches.

IDENTIFICATION.—It may be identified by the barred axillar feathers under the wing; too, it lacks the white bars on the wing that are conspicuous in the spotted sandpiper when in flight. Another good field character of this species is its solitary habit.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds in Alaska and adjacent areas, chiefly west of the Rocky Mountains. It was noted by us in the McKinley region at Igloo Creek, where a breeding bird was collected July 26, 1932, and at Wonder Lake on August 9, 1932, when a bird of the year was taken.

HABITS.—The Western solitary sandpiper was found to be a rare but breeding species in the McKinley region. Although special watch was kept for it in its favorite haunts, about small quiet ponds in deep woods, only two individuals rewarded our search.

WANDERING TATTLER

Heteroscelus incanus [GMELIN]

GENERAL APPEARANCE.—A medium sized gray wading bird; plain slate above, from head to end of tail; under parts white crossed by irregular

slate gray bars. The throat is white, finely speckled with gray; the bill is black and slender, and it is as long, or longer, than the head. Length, 10.5 inches.

IDENTIFICATION.—The heavy gray barring on the under parts of the wandering tattler and the plain slate back are diagnostic. These birds are very noisy during late June and July. Frequently when an intruder approaches they fly toward him with a loud noise of alarm and often perch on the tops of willows, scolding vigorously.

DISTRIBUTION.—It inhabits the rocky islands and shores of the Pacific in North and South America. This is a purely maritime species except during the breeding season. It breeds in the interior of Alaska along the eastern flank of the Alaska Range. In McKinley Park it is found in summer along the rocky stream beds, especially near the upper portions and the headwaters of streams. Savage River, Igloo Creek, and Sanctuary River are favorite haunts of this rare species.

HABITS.—The wandering tattler has been found nesting only in the Mount McKinley National Park. It is, therefore, worth making an effort to see this species on its breeding ground. The tattler and the surfbird are the elite in Alaskan bird society. Several pairs of tattlers are to be found in summer along the upper portion of the Savage River.

Generally speaking, the birds are to be found foraging along the water's edge, particularly where the stream flows swiftly, and the streambed is composed of fair-sized cobblestones. The slatish color of the back of the bird blends surprisingly well with the rocky background (fig. 33). A person may be within 20 or 30 feet of a tattler and still not notice the bird. They seemed to be aware of the fact that they were practically invisible so long as they stood stock still, and they often remained motionless and let us pass within a few yards of them.

In foraging, the tattlers would thrust their bills down, keeping their heads in a nearly vertical position, feeling around under the water about the edges of the larger pebbles and stones. In shallow water we could see the smaller pebbles, those about the size of marbles, move as the birds worked around them and under them with their bills, searching for certain fresh-water slugs and aquatic insects. On one occasion, where the water was 4 inches deep, the bird's whole head and part of the neck were immersed for as long as 10 seconds at a time. On May 21, while we observed them, one of the birds waded out into a pool of water until it got beyond wading depth. Instead of trying to fly across to the other side of the pool, this bird just sat down in the water and swam across, paddling vigorously with its feet, in true duck fashion.

Figure 33.—THE SLATE COLOR OF THE WANDERING TATTLER (CENTER) BLENDS SO WELL WITH THE ROCKY BACKGROUND THAT A PERSON CAN WALK WITHIN A FEW FEET OF THE BIRD WITHOUT SEEING IT. *Photograph taken May 24, 1926, Savage River. M. V. Z. No. 5270*

The tattlers are noisy birds when flushed, particularly when they have young, but during the period of incubation they are remarkably quiet and secretive. The male bird usually stands on guard. He gives a warning to his mate of the approach of enemies, and this warning enables the brooding female to sneak off the inconspicuous nest, unobserved, while enemies are still at some distance. The eggs are spotted and colored in such a manner as to blend with the background, rendering them, too, difficult of detection, even when a person is standing almost over them.

The nesting sites are located on open, gravelly bars, where the accumulated rocks are about the size of cantaloupes. The nest itself is merely a depression, wallowed out by the bird, between small boulders. A scant lining of interwoven willow rootlets cradles the eggs and keeps them from coming in direct contact with the broken, sharp edges of the rocks.

On May 24, a male tattler began to scold as soon as we came near him. Then he flew around us on a tour of investigation, finally alighting, as is their usual way, in the top of a slender, dead willow (fig. 34). His mate was feeding at the edge of a nearby pool; soon he flew back and circled over her, fluttering and pausing momentarily while he uttered a clear "tweet tweet tweet", very much as does the spotted sandpiper in its mating season.

Figure 34.—WANDERING TATTLERS, WHICH ARE STRICTLY WADING BIRDS, HAVE CONSIDERABLE DIFFICULTY IN MAINTAINING THEIR BALANCE WHEN PERCHED FOR VANTAGE IN A WILLOW TOP. *Photograph taken July 14, 1926, Savage River. M. V. Z. No. 5297.*

The perching ability of tattlers, which are strictly wading birds, is not very great, and they have considerable difficulty in maintaining their balance when perched for vantage in a willow top. Most of the tattler chicks heed the warning of their parents instantly and crouch motionless, with neck extended, on the gray gravel, their gray backs blending perfectly with the slatish color of the rocks. As long as the intruder remains in sight, the parent tattlers keep up their warning cries, and when close pressed, they often teeter nervously up and down just as the sandpipers do. However, we found that if we walked away, as if apparently leaving the locality, the parent tattlers would soon call forth their chicks and resume hunting for minute aquatic insects along the shallow margins of the clear, seepage water.

On June 21, near the head of Savage River, we found a tattler feeding in water which was only an inch or so deep. It kept its eye on us as it fed (fig. 35), frequently reaching under the stones with its bill. As long as we remained in sight, it stood motionless, crouched between two rocks.

On June 22, as we again approached this spot, the male tattler began to chirp excitedly, the warning call being very much like the metallic warning note of the California ground, or digger, squirrel. As we stood listening, we heard a faint reply to the parent's call, and looking upstream, saw a downy young tattler chick running about, seeking food. We ran up and caught this chick, which instead of hiding at once, ran across the open

gravel bars toward a clump of willows. Looking around, we discovered another chick, running up the gravelly stream bed. As we ran after him, we almost stepped on the third chick, which had crouched motionless on the rocky ground. The fourth and last chick in the brood was then spied just as he was going out of sight. During this time, both parents fluttered about wildly at our feet, finally flying up and perching in the willow tops nearby. When we put the chicks into our rucksack, the male tattler came up and nestled down about 4 feet away from the sack and tried to call the chicks to him. This call, or brooding note, was a low "deedle-deedle-cherr."

The general appearance of the parent birds was much the same. However, the male is about one-half an inch smaller in length than his mate. He is also darker, particularly with regard to the dark bars across the breast. The white area on the chin of the male is covered with small, faint, dark spots. It, rather than the female, showed the greatest anxiety and solicitude for the welfare of the chicks. When one of the downy youngsters, which we had turned loose, peeped plaintively, the male tattler flew over and, with partially spread wings, hovered the chick

Figure 35.—MALE WANDERING TATTLER FORAGING AT THE WATER'S EDGE.
Photograph taken June 22, 1926, Savage River. *M. V. Z. No. 5282.*

(fig. 36), uttering, meanwhile, a series of reassuring notes. Then both parents accompanied and coaxed this youngster about until the chick came to a steep gravel bank, where it sought refuge under a shelving rock. At this time we saw the adult birds pursue crane-flies which they captured on the wing, jumping clear off the ground in doing so; and again we watched them feeding on small fresh-water snails and small larvae. The chicks are able to swim as soon as they are hatched. This was demonstrated by one downy youngster when he came to a place where the water was deep. However, the young do not take to water as readily as do the chicks of the semipalmated plover.

By July 12, we found that the young tattler chicks had grown surprisingly and that their slate-colored primary wing feathers were already more than an inch long. The gray, natal down on their backs was entirely replaced by slate-colored feathers, and on the lower breast and belly the natal down was replaced by cream-colored pinfeathers. When we attempted to capture a young tattler, he sought to hide, not out upon the open gravel, as he did when 2 or 3 days old, but by running and hiding (fig. 37) amid the grass and flowers that grew on the stream bank. If

Figure 36.—MALE WANDERING TATTLER HOVERING HIS CHICK.
Photograph taken June 22, 1926, Savage River. M. V. Z. No. 5269.

Figure 37.—YOUNG WANDERING TATTLER, ONE-THIRD GROWN, SEEKING REFUGE IN DENSE VEGETATION. *Photograph taken July 8, 1926, Savage River. M. V. Z. No. 5296.*

closely pursued, he would take to the water, where he swam readily, making headway even against a fairly stiff current. By this date, when about 12 days old, young tattlers were active and fleet enough to capture flying insects that moved about the clumps of fireweed growing on the sandy bank. The young tattlers mature rapidly and leave their birthplaces early in the fall. As early as August 9, 1908, at Prince William Sound, in a locality about three or four hundred miles distant from their known breeding ground, I collected a barely fledged young tattler.

In 1932, our experience with wandering tattlers was similar to that of 1926, except that fewer pairs—only about one-half as many—were present. This seasonal decrease is believed to have been due to the adverse weather and snow conditions in Mount McKinley National Park where this species breeds each season in limited numbers.

LESSER YELLOW-LEGS

Totanus flavipes [GMELIN]

GENERAL APPEARANCE.—A graceful wader, about the size of a killdeer

with long yellow legs. It is finely patterned in black and white. Length, 10.7 inches.

IDENTIFICATION.—Good identification characters for this bird are its long, slender yellow legs, gray back, and the large amount of white on the tail and rump, which latter is particularly noticeable when the bird takes flight. The lesser yellow-legs has a straight bill and is smaller in size than the greater yellow-legs.

DISTRIBUTION.—It is distributed throughout North and South America. It breeds from northern British Columbia northward at least to the McKinley district in Alaska. This species is rare in McKinley Park and is a bird of the lower grassy plains.

HABITS.—On July 2, 1926, near Healy on the Alaska Railroad, we saw two pairs of lesser yellow-legs feeding about a grassy pool. One pair had two downy young which stood about 4 inches high. On June 16, 1926, near the Sanctuary River, I collected an adult male lesser yellow-legs which was feeding along the margin of a grass-rimmed pool. This specimen (No. 8784 J. D.) had testes more than one quarter of an inch in length and was found to be in full breeding condition.

BAIRD'S SANDPIPER

Pisobia bairdi [COUES]

GENERAL APPEARANCE.—A true sandpiper slightly smaller than a robin. This bird is white below and brown above; it has a pale buff band across the breast. Length, 7.5 inches.

IDENTIFICATION.—Baird's sandpiper resembles a large least sandpiper, but the back has a scaly, rather than a streaked, appearance. It may be distinguished from the buff-breasted sandpiper by its whitish chin and black instead of dull yellow legs.

DISTRIBUTION.—It is distributed throughout North and South America, breeding in the Arctic regions of northwestern North America. In the McKinley region it is found only in the higher mountain passes above timber line.

HABITS.—One of the surprises of our trip to Mount McKinley was the finding of Baird's sandpipers breeding high above timber line in nearly all of the higher, wet passes. On June 28, 1926, at the extreme head of Savage River, two male birds of this species were collected. These were found on the frozen shore of a little lake in a hanging meadow, at 5,500 feet, near the very crest of the range. The regional conditions at this point were truly arctic, since deep snow slides filled many of the hanging valleys.

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The two male birds collected were in hot pursuit of a female and went through ardent courtship flights and displays. Their reproductive organs indicated that they had not yet bred.

At Copper Mountain on July 11, a male Baird's sandpiper was collected that pretended to have a broken wing and successfully decoyed us away from its nest, which was probably located in a marshy stretch of tundra.

Again, at Copper Mountain, near Muldrow Glacier, on July 13, we collected an immature female (No. 8897 J. D.). There still existed a patch of natal down on the back of the bird's head. However the bird still had the white-margined feathers of the immature plumage on its back and was able to fly a short distance and to forage by itself along the margin of a shallow pool. This individual was in exactly the same plumage as a specimen which I collected at Herschel Island, Yukon Territory, on July 30, 1914, and was figured in *The Condor* for May 1917 (p. 84).

On July 18, 1932, a mated pair of Baird's sandpipers was found high up in Sable Pass. Their actions indicated that they had a nest nearby. This species is believed to breed regularly in limited numbers in the mountain passes of Mount McKinley National Park.

RED-BACKED SANDPIPER

Pelidna alpina sakhalina [VIEILLOT]

GENERAL APPEARANCE.—A chunky sandpiper slightly smaller than a killdeer. The bill is longer than the head and has a slightly down-curved tip. In summer, it has a black patch across the belly; the back is reddish. The chin and hind lower surface and wing band are white. Length, 8 inches.

IDENTIFICATION.—In summer, this sandpiper may be recognized in the field by its red back, black patch across the belly, and its slightly down-curved bill tip.

DISTRIBUTION.—It breeds on the northern coast of Siberia and in Alaska from Demarcation Point to the mouth of the Yukon River. It was observed in midsummer at Copper Mountain near Mount McKinley.

HABITS.—On July 19, 1926, Wright saw two waders at close range on a gravel bar, which, because of their reddish backs and other markings, he believed to be red-backed sandpipers. It is therefore possible that this species will be found breeding on the Arctic tundras in the higher meadows of the McKinley region.

WESTERN SANDPIPER

Ereunetes maurii [CABANIS]

GENERAL APPEARANCE.—A "peep" or small sandpiper. The bill is longer than the head and is usually slightly curved down at the tip. It has a blackish spotted breast band which lacks the buffy ground color found in the Baird's sandpiper. It has webs between the bases of its front toes. Length, 6.5 inches.

IDENTIFICATION.—The upper parts are bright chestnut, mottled with gray and black, and the spotting on the breast is sharply defined. It is a "peep" with black legs and with a bill that is longer than its head.

DISTRIBUTION.—It breeds on the northwestern coast of Alaska. It is found along Savage River in McKinley Park.

HABITS.—On June 18, 1926, I found a lone western sandpiper foraging quietly along a backwater pool of Savage River. Its tameness and solicitous actions as it tried to decoy me away from the locality led me to believe that the bird was nesting. Frequently afterwards, a bird of this species, believed to be the same individual, was watched at this locality, but repeated searching failed to disclose the nest. Therefore, we are unable to produce positive proof that this species nests in the McKinley region; however, our observations indicate that it does breed in the park area.

NORTHERN PHALAROPE

Lobipes lobatus [LINNAEUS]

GENERAL APPEARANCE.—A small, graceful sea snipe, wader-like in form, but with dense plumage and webbed toes. It is an expert swimmer. The female is larger and, in summer, more brightly colored than the male. These birds are dark gray above. The under parts and the throat patches are white and the bill is needlelike. The sides of the neck are brick red. Length, 7.7 inches.

IDENTIFICATION.—The needlelike bill, small size, and scalloped toe-webs, and the bird's ability to swim serve to distinguish the species from other shore or wading birds.

DISTRIBUTION.—It is distributed throughout the northern and southern hemispheres. It breeds across the Arctic portion of North America, and is usually found in small ponds above timber line in McKinley Park.

HABITS.—Five northern phalaropes were noted busily feeding in a small pond on July 1, at Jenny Creek. These birds were whirling and spinning about on the water, meanwhile uttering a low "churr."

At the summit of Thompson Pass, on July 11, we found four Northern phalaropes feeding in a small pond. Their actions indicated that they were nesting in a grass-grown pond. This was further substantiated by us when we collected a male bird which was in full breeding condition at Copper Mountain, on July 19, near the same place where the five adults, which were apparently breeding, had been observed on July 13, 1926.

LONG-TAILED JAEGER

Stercorarius longicaudus [VIEILLOT]

GENERAL APPEARANCE.—A predaceous, black and white, gull-like bird, with a hooked bill, sharp claws, and webbed feet. Length, including the long, slender central tail feathers, 21 inches.

IDENTIFICATION.—In flight the long central tail feathers form the best identification mark for this species. When perched on the tundra the white breast of this bird is visible at a considerable distance.

DISTRIBUTION.—It breeds in the Arctic regions of Europe, Asia, and America. It is usually found during the nesting season in the neighborhood of wet or marshy tundra. In McKinley Park, it was noted by us nesting on the divide between the Savage and Sanctuary Rivers and in Polychrome Pass, and it was also seen in Sable Pass.

HABITS.—Two pairs of these jaegers were found nesting on June 16, 1926, in the Sanctuary Divide. In each instance the incubating bird was seen at several hundred yards distance, owing to the conspicuous white breast of the bird and to the exposed position of the nest. The latter was merely a slight depression wallowed out in the tundra moss in a dry, slightly elevated spot. In each case, there was but a single well-incubated egg in the nest. In a known instance the bird which was the most fearless in defense of the nest and which incubated the eggs proved, when secured for a specimen, to be the male.

The long-tailed jaeger is the most graceful flier among all of the birds in the McKinley district. Even when the breeze is very slight, these birds are able to soar about with the greatest ease. The long flexible tips of the wings are maneuvered to stabilize flight and to take advantage of slight changes in air currents.

In every instance where we found jaegers breeding in McKinley Park, we found one or more pairs of Hudsonian curlews living and foraging in the same wet meadows with them. Insofar as we could discover, there were no complications arising from these two species of birds living so closely together. This seems the more remarkable since jaegers are notorious

robbers and live largely, during the summer, on the eggs and nestlings of other birds. However, it is our belief, after extended observations on the breeding grounds, that the jaeger-curlew company is a mutually protective association, the curlews acting as watchmen and the jaegers as patrolmen to evict robbers.

On June 30, 1932, a nest containing two eggs of this species was found at Sable Pass. There being no fabricated nest, the eggs were deposited in a slight depression. The earliest arrival in spring reached Wonder Lake on May 21, 1929. Our observations show that this species breeds regularly in the McKinley region.

HERRING GULL

Larus argentatus smithsonianus [COUES]

GENERAL APPEARANCE.—A large swimming bird with flesh-colored webbed feet, a pearl-gray back, and pure white head and under parts. Length, 24 inches.

IDENTIFICATION.—Characters which distinguish this species of gull from all other gulls in the McKinley region are the large size, the flesh-colored, instead of yellow, feet, and the suffused red spot on the lower half of the bill.

DISTRIBUTION.—It breeds in the interior of Alaska and Canada. In McKinley Park, herring gulls breed on islets in the larger ponds and smaller lakes. They were noted by us at Savage River, Highway Pass, and Copper Mountain.

HABITS.—These large gulls reach the McKinley district early in the season. First arrivals were noted by Mr. and Mrs. John E. Anderson, at Wonder Lake, at 11:30 a. m. on May 9, 1927, and at 2 p. m. on May 8, 1929. In 1926 we first noted herring gulls at Savage River on June 1, when an adult female was collected. Dissection showed that this female had laid her set of eggs. Well-marked incubation patches were present on the lower breast of this specimen. This species does not nest on the open gravel bars along the rivers, as does the smaller short-billed gull. A pair of herring gulls was encountered in Highway Pass on July 11, and from their actions they evidently had a nest on an islet in the middle of a large pond, where it was safe from most predators. These large gulls were never numerous, three being the largest number encountered in any one day. At Copper Mountain near Muldrow Glacier, on July 13, 1926, we found many meadow mice were being drowned out of their homes in willow thickets because of the changing course of a stream. A pair of herring gulls flew back and forth continuously over this flooded area. They were searching for meadow mice and nestling birds that were being left homeless by the swiftly changing stream.

A few scattered pairs of large herring gulls nest annually in the McKinley region, but we never found them present in flocks of 20, as was the case with the smaller short-billed gull.

SHORT-BILLED GULL

Larus canus brachyrhynchus [RICHARDSON]

GENERAL APPEARANCE.—Similar in color to the herring gull, but much smaller in size. The bill is yellow without spots or rings. The feet and legs are yellowish-green. Length, 17.5 inches.

IDENTIFICATION.—The smaller size and greenish-yellow, instead of flesh-colored, feet, distinguish this species from the large herring gull, which is the only other gull commonly found in the McKinley region.

DISTRIBUTION.—It is found chiefly along the larger streams which afford extensive gravel bars suitable for nest sites. It was noted by us at Savage River, on the East Fork of Toklat River, and at Copper Mountain.

HABITS.—Short-billed gulls were just arriving when we reached the Savage River on May 19. Three gulls of this species were seen flying singly, low to the ground against a strong north wind. These earliest arrivals were apparently in migration, since they did not stop but kept on going northward. During the last week of May, six of these gulls took up quarters along the gravel bars of the river near our camp. The number of "mew" gulls increased until June 5, when 16 were present. After this date the number again dropped to three pairs which remained and bred on the open gravel bars of the river.

On bright days these gulls spent much time bathing in the icy water and sunning themselves on the gravel bars. Mornings and evenings they were often to be seen perched together in groups, watching for mice in the meadows near the stream. The meadow mice live in colonies and have many burrows running along just beneath the brown moss. The gulls wait at the openings of such burrows until the half-grown mice, which are not wise, come along, furnishing the gulls' breakfasts or dinners. It was a striking sight to see the dark green meadows dotted with the white-headed gulls, that stood like statues, for hours at a time, waiting for some unwary mouse to appear. At that season of the year, food was at its lowest ebb and the gulls appeared to realize that it would take less energy, with more certain returns, to stand and wait for mice, than to fly about and hunt for food far and wide.

Later in the season, when summer visitant birds began to nest, the short-billed gulls were seen daily hunting for ptarmigan and other eggs. On such

forays the gulls would start out in the morning, three or four flying together in close formation, just over the tops of the low willow and dwarf birch bushes. They maintained a sharp lookout, with heads cocked sidewise eyeing the ground 4 or 5 feet beneath them. When they located a ptarmigan nest, they would string out in single file. The leading gull would swoop down menacingly upon the hen ptarmigan as she sat on her nest. The first bird would be followed quickly by the second gull and the third. Even if the female ptarmigan were not driven entirely off her nest, she was likely to shift her position on it. Then the gulls would be quick to seize and carry off any eggs that might be momentarily uncovered. Many eggs or nestlings, and sometimes the entire contents of the nest, would be destroyed thus by these gulls.

On June 11, a "mew" gull's nest was found out on an open gravel bar where the river broke up into several interlacing channels. This nest was relatively small, being well and firmly built of dead rootlets and plant fiber compactly built together. It was placed amid several small piles of driftwood which it closely resembled. Another nest, containing two eggs (fig. 38), was discovered on June 18. The nest was placed out in plain sight amid small piles of driftwood on an open gravel bar in the river. It was made of small sticks and rootlets, and it measured 12 inches in length and

Figure 38.—A SHORT-BILLED GULL ON HER NEST.
Photograph taken June 18, 1926. M. V. Z. No. 5001.

in breadth outside. The inner cavity of the nest measured 5 by 7 inches. The nest cavity was 2 inches deep. We found, by watching with binoculars, that when a man appeared on the horizon the female gull on the nest would stretch up her neck in alarm and then would sneak off her nest while the intruder was yet a long way off. At other times, if a person walked slowly by the nest at a distance, the gull would merely crouch down on her nest, keep her neck near the ground, and remain motionless, thus trying to escape notice.

At Copper Mountain, on July 12, a downy young gull about one-fourth grown was found swimming about on a small lake. This downy youngster hid in the grass at our approach and was tenderly watched over by one parent. The other parent gull was found dead, floating in the lake. The surviving parent was observed to pursue and drive away a short-eared owl, and even golden eagles and gyrfalcons, that came near this lake which sheltered the young gull.

The first spring arrival was noted at Wonder Lake on May 9, 1927, and on May 8, 1929. Our observations showed that this is one of the common breeding birds of the McKinley region.

ARCTIC TERN

Sterna paradisaea [BRÜNNICH]

GENERAL APPEARANCE.—A small gull-like bird, grayish above and white beneath, with webbed feet, forked tail, and a black cap on the top of its head. Length, 15.5 inches.

IDENTIFICATION.—Because of their habits and lightness of action when on the wing, the terns are aptly called sea swallows. The Arctic tern may be distinguished from the common tern by an all red bill and deeper grayish suffusion over the breast and under parts. The feet and legs of the Arctic tern are very small and weak.

DISTRIBUTION.—It breeds in the Arctic regions of North America and winters as far south as the Antarctic continent, making the longest annual migration of any known bird. It was noted by us along the McKinley River.

HABITS.—Mr. and Mrs. John E. Anderson reported the first arrival of the Arctic tern at Wonder Lake at 3 p. m. on May 13, 1927.

Our only contact with this species was on the headwaters of the McKinley River below Muldrow Glacier. At McKinley River bar, three terns were seen by us on July 17, 1926. At Copper Mountain I watched a pair of terns as they flew about over a pond on the tundra, but the birds eluded

me when I tried to collect one as a specimen. However, in 1932, an adult female was collected on May 23, near Windy. A few pairs of this species breed regularly in the McKinley region.

SAINT MICHAEL HORNED OWL

Bubo virginianus algistus [OBERHOLSER]

GENERAL APPEARANCE.—A large dark-colored owl with well developed ear tufts or "horns" and finely vermiculated feathers. Length, 22 inches.

IDENTIFICATION.—Good field characters for this bird are its large size, its ear tufts, and its deep call note—"Who! who! ta whoo!"

DISTRIBUTION.—Horned owls are found in wooded sections over most of North America. *Algistus* is found in northwestern Alaska from Mount McKinley to Kotzebue Sound. In the McKinley region, horned owls have been seen at Wonder Lake, Toklat River, and at park headquarters.

HABITS.—Horned owls are rare in the McKinley region. Mr. and Mrs. John Anderson preserved a flat skin from an owl killed at Wonder Lake. This specimen has been compared with the series of horned owl skins in the Museum of Vertebrate Zoology and was found to be between *subarcticus* and *algistus* but nearer the latter. Charles Sheldon (1930, p. 168) reports in 1907, that, "whenever rabbit tracks in the snow were observed, the following night or the next, the hoots of a great horned owl nearby would be heard. Then no fresh tracks could be found in the woods and none leading from them." This was near his winter camp on the Toklat River.

Not far from park headquarters at 8:30 o'clock on the evening of July 28, 1932, a large horned owl flew across the road within 50 feet of us. It was in plain sight. On this date the days were getting noticeably shorter so that there was a real feeling of evening by 9 o'clock and by 8:30 it was dusky enough for the owl to be out hunting.

In our experience, the St. Michael horned owl is a rare resident in Mount McKinley National Park. It is probable that its presence is revealed by its hooting, more frequently in winter than in summer.

SNOWY OWL

Nyctea nyctea [LINNAEUS]

GENERAL APPEARANCE.—A large white owl without ear tufts or horns, but usually with a few bold broad dark bars on the body. These bars do not involve the face. Length, 25 inches.

IDENTIFICATION.—It is a large, white owl with a round head and it lacks horns.

DISTRIBUTION.—The breeding grounds of this large bird, which is known to the Eskimos by the name, "Oök-pick", are Arctic America and Siberia.

HABITS.—Charles Sheldon (1930, p. 229) reports that on December 2, 1907, at his caribou camp on the rolling plain near the north boundary of McKinley Park, he saw "forty or fifty snowy owls that afternoon—some very dark a few very white. All were wild . . . and sat motionless, either on a hummock or a surface elevation, their heads constantly revolving as they watched for mice." Sheldon observed snowy owls all through the winter and following spring, the last observance mentioned being April 26, 1908.

AMERICAN HAWK OWL

Surnia ulula caparoch [MÜLLER]

GENERAL APPEARANCE.—An owl of medium size, without horns; but it has a long tail and a hawklike appearance. Length, 15 inches.

IDENTIFICATION.—The long tail; the regular barring of the under parts; the direct, rapid, shrikelike flight, and this owl's habit of hunting its prey chiefly in the daytime from a perch in the open, on the top of a tree, are all good field characters.

DISTRIBUTION.—It breeds from northwestern Alaska and Hudson Strait to southern British Columbia. It is generally distributed over the wooded sections of the Mount McKinley region.

HABITS.—In 1926, which was a good mouse year, we found hawk owls abundant in the McKinley region. Our first encounter with this species was on June 8, 1926, when Wright found a bob-tailed young hawk owl sitting unconcernedly on the ground in the middle of the road. On June 10, while we were hunting in the spruce woods near Savage River in mid-afternoon, I heard a hawk owl calling nearby. The owl was soon discovered perched in the top of a tall dead spruce. It gave its characteristic call from the tree several times. This call note, which is given frequently when two of the owls are hunting together, is a long-drawn-out screech, with a sharply accentuated higher ending. The first part of the call lasts nearly one second and the accented ending endures for about one-tenth of a second. The call is well represented by the words, "all right"; the "all" is long and drawn out, and the "right" is given explosively in a rising pitch—"all-l-l-l-l right."

The hawk owls that we encountered hunted in the middle of the day in bright sunlight, rather than at night. The young hawk owl (fig. 39), which Wright discovered in the road, was kept alive and reared by us. It was quiet at night, but it was exceedingly active in the daytime, particularly when the sun was shining.

The reaction of this owlet to various noises was interesting. When we made a slight mouselike noise by scratching, it was all attention, scanning the ground in all directions. However, if a person stood close to the bird and called out sharply, the bird would shake its head violently each time the sharp noise was made, showing signs of evident discomfort. We concluded that the owl's sensitive ears are attuned to catch slight sounds and that the bird suffers pain from the strong vibrations of loud or nearby sounds.

Figure 39.—A YOUNG AMERICAN HAWK OWL, HALF GROWN. *Photograph taken June 13, 1926, Savage River.* *M. V. Z. No. 5055.*

Near Double Mountain on July 22, 1926, we encountered a family of four fully grown young hawk owls at midforenoon. Although they were as large as their parents and seemingly able to take care of themselves, these young owls sat around in the tops of spruce trees and waited and called for their parents to bring them food.

In 2 days—June 12 and 13, 1926—we actually counted 39 hawk owls. Up to the time the young were out of the nest, about June 5, these birds were rarely seen. Then suddenly they were found everywhere in the spruce woods. After the young owls were able to hunt their own food they became quiet and less noticeable, and we saw them but rarely.

In 1932, when I went over this same territory, I hunted high and low for hawk owls and was unable to find a single one during the entire summer. Charles Sheldon (1930, p. 280) saw one hawk owl on the Toklat near the mouth of the Clearwater on January 26, 1908. This was the one owl of this species observed during the entire year. Hawk owls may be common or rare in the McKinley region according to the abundance or absence of mice.

SHORT-EARED OWL

Asio flammeus flammeus [PONTOPPIDAN]

GENERAL APPEARANCE.—A medium sized owl with two small ear tufts close together rising from the center of the forehead. The general color of this bird is buffy, distinctly striped below with brown. The birds of this species from Mount McKinley National Park and the Arctic coast of Alaska are very light-colored. Length, 15.5 inches.

IDENTIFICATION.—This owl, which is found on the open marshes and tundra, may be identified by its light color, medium size and small, centrally located ear tufts.

DISTRIBUTION.—It breeds in northern Alaska from Mount McKinley to Point Barrow, east to Greenland, and south to California.

HABITS.—The short-eared owls inhabit the open tundra. The first arrivals in the spring were noted by Charles Sheldon at Toklat on May 1, 1908. He saw several owls of this species which were all flying high. By May 4, Sheldon reports that many mated pairs of short-eared owls were present, flying back and forth low over the tundra catching lemmings. At other times these owls soared high in the heavens with wings extended for a few moments, then they would flap them again and utter a rapid series of low hoots. Every now and then, while soaring aloft, one of the owls would dive down for a distance of 20 feet, flapping its wings quickly and making a peculiar barking call that sounded like the ki-yi of a small dog. These nuptial, or mating, performances were noted by us many times in 1926.

On July 16, 1926, on a stretch of wet tundra near Copper Mountain, I flushed a male short-eared owl that was sitting at the base of a hummock watching a mouse burrow. This bird was collected. It proved to be a very light-colored individual, similar in color to those I had observed at Point Barrow in 1914.

In 1932, careful watch was kept for short-eared owls in the identical areas and places that they had been found in 1908 and 1926, but not a single one could be found. Like the hawk owl, the presence of nesting pairs in the McKinley region seems directly dependent upon the abundance of meadow mice and lemmings.

RICHARDSON'S OWL

Cryptoglaux funerea richardsoni [BONAPARTE]

GENERAL APPEARANCE.—A small, round-headed, brown and white owl about the size of a small screech owl, but without "horns." Length, 10 inches.

IDENTIFICATION.—It is larger than the saw-whet owl, and the light-colored facial disk of the Richardson's owl contrasts sharply with the surrounding dark feathers of the head, which in the saw-whet owl blend softly with the head feathers.

DISTRIBUTION.—It breeds from the limit of trees in central Alaska, and northern Yukon and Mackenzie south to British Columbia. It breeds also in northern Alberta, Manitoba, Nova Scotia and the Magdalen Islands.

HABITS.—Our only record for this species in Mount McKinley National Park is of "a male killed [by Sheldon at Toklat] on May 4, 1908" (Sheldon, 1930, p. 401). From our own experience and that of others living in the McKinley region, we believe that this owl is one of the rarest raptorial species to be found there.

WESTERN BELTED KINGFISHER

Megaceryle alcyon caurina [GRINNELL]

GENERAL APPEARANCE.—A stubby bird, somewhat larger than a flicker, with a slaty-blue back and breast band. The large pointed bill, weak feet, and ragged crest on top of the head are conspicuous characters of this bird which is nearly always closely associated with ponds and streams. Length 13 inches.

IDENTIFICATION.—Good field characters for the kingfisher are its rattling cry, large head, ragged crest, and habit of perching over water and diving with a splash into it after food.

DISTRIBUTION.—This species of bird is found over most of North America. The western race breeds from "northern Alaska and Yukon Territory southwest of the Rocky Mountains to San Diego County, Calif."

HABITS.—Kingfishers are rarely met with in the McKinley region. Sheldon reports seeing a kingfisher on the Teklanika River on August 21, 1906. Later he reports that the first spring arrival was noted by him at Toklat on May 29, 1908. One specimen, a flat skin, of a bird of the year was preserved by Mr. and Mrs. John E. Anderson at Wonder Lake.

NORTHERN FLICKER

Colaptes auratus luteus [BANGS]

GENERAL APPEARANCE.—A northern form of the well-known yellow-hammer. The color of the back is grayish-fawn, barred with black. It has a red patch on the back of the head. The under parts are light-colored dotted with sharp, round black spots and the under surface of

the wing is brilliant yellow in color. It has broad white patches on the rump which are conspicuous when the bird is in flight. Length, 12 inches.

IDENTIFICATION.—The black crescent band across the breast, the yellow under the wings, and the white rump, together with the well-known call, "flicker-flicker-flicker" are all outstanding field characters of this bird.

DISTRIBUTION.—It breeds in northern Canada and in Alaska from Mount McKinley north to the limit of trees and south throughout the northern and central United States. In the McKinley region it is confined chiefly to forested areas of cottonwood and aspen.

HABITS.—Northern flickers were found breeding in the aspen groves and in black cottonwood trees along the larger streams in the McKinley region. We saw them first at Savage River on May 24, 1926. A single individual was observed almost daily during the first half of May both in 1926 and in 1932.

This bird is a regular breeding species in the McKinley region.

NORTHERN HAIRY WOODPECKER

Dryobates villosus septentrionalis [NUTTALL]

GENERAL APPEARANCE.—A woodpecker of medium size with black and white coloration. The back stripe is pure white as are also the outer tail feathers. The male bird has bright red nape spots on the back of the head. Length, 9.4 inches.

IDENTIFICATION.—The hairy woodpecker may be distinguished from the Alaska and the Arctic three-toed woodpeckers by the white stripe on the back—the Alaska three-toed woodpecker having a black and white ladder-back, and the Arctic three-toed woodpecker having an all black back. Too, the red crown cap of the male northern hairy woodpecker differentiates this bird from the males of both three-toed woodpeckers which have yellow crown caps.

Another distinction which should be made is that of the definite and distinguishing difference between the downy woodpecker and the hairy woodpecker, the latter is larger in size and the outer tail feathers are pure white, instead of white barred with black as are those of the downy woodpecker.

DISTRIBUTION.—It is distributed throughout the Canadian Zone of northern North America from Mount McKinley, middle Yukon, central Mackenzie south to the Canadian-United States border. In the McKinley region it is found at low elevations along rivers, chiefly in cottonwood and aspen groves.

HABITS.—On August 20, 1932, an adult male bird of this species was seen at close range, drilling into a dead cottonwood tree at McKinley Bar. On August 30, 1932, at Park Headquarters, another male was examined with binoculars at a distance of 25 feet.

The northern hairy woodpecker is a noisy bird, calling loudly and drilling or drumming on dead resonant limbs, whereas, both the Arctic and Alaska three-toed woodpeckers are quiet birds that work unobtrusively, flaking off bits of bark with their bills.

The northern hairy woodpecker is a regular, but not numerous, breeding species in the McKinley region.

NELSON'S DOWNY WOODPECKER

Dryobates pubescens nelsoni [OBERHOLSER]

GENERAL APPEARANCE.—A small black and white woodpecker with a broad white stripe down the back. The male has a bright red patch on the back of the head. The outer tail feathers are barred with black. Length, 6.8 inches.

IDENTIFICATION.—The small size and barred outer tail feathers distinguish this woodpecker from the northern hairy woodpecker which is similar in color and pattern but which is larger.

DISTRIBUTION.—It is distributed throughout "northwestern Alaska and southwestern Mackenzie to southern Alaska; extreme northern British Columbia, and central Alberta." It is found in the McKinley region chiefly in groves of aspen and willow.

HABITS.—At Igloo Creek on July 7, 1932, I watched an adult male Nelson's downy woodpecker working on an old dead stump drilling for wood-boring larvae. On July 28, 1932, another Nelson's woodpecker was seen in an aspen grove near Park Headquarters. A third bird of this species was seen on August 20, 1932 at McKinley Bar. An adult male Nelson's downy woodpecker was taken on May 7, 1932, by F. Nyberg, near Windy; it was preserved as a specimen.

This species is a common summer and winter resident in the park.

ARCTIC THREE-TOED WOODPECKER

Picoïdes arcticus [SWAINSON]

GENERAL APPEARANCE.—A woodpecker of medium size, with three instead of four toes. The back is all black. The male bird has a broad yellow patch on top of the head. The flanks are white, heavily barred with black. Length, 9.5 inches.

IDENTIFICATION.—The yellow crown patch will distinguish the male, and the solidly black back, the female, from all other woodpeckers in the McKinley region.

DISTRIBUTION.—It breeds from central Alaska, Yukon, and northern Quebec, south along the Sierra Nevada to central California and in the eastern United States to the northern tier of States.

HABITS.—Our sole record for this species in the McKinley district is based upon an adult female (No. 8918 J. D.) collected by F. Nyberg and myself, on the Nenana River, near Windy, May 8, 1932. This bird probably traveled up the Nenana River from the Tanana Valley. All of the three-toed woodpeckers observed farther out in the park were of the smaller "American" type. It is a rare species, and probably breeds in the park along the Nenana River.

ALASKA THREE-TOED WOODPECKER

Picoïdes tridactylus fasciatus [BAIRD]

GENERAL APPEARANCE.—A smaller three-toed woodpecker than *arcticus*. It has a barred black and white back. Length, 8.7 inches.

IDENTIFICATION.—The ladder-back will distinguish this species from the Arctic three-toed woodpecker. The yellow crown of the male is a distinctive mark of male three-toed woodpeckers.

DISTRIBUTION.—It is found in central Alaska, Yukon, and western Mackenzie south to Oregon, Washington, Idaho, and Montana. Usually it may be seen in spruce timber in the McKinley region.

HABITS.—The Alaska three-toed woodpecker is the more common form in the McKinley region, *arcticus* being rare there. Three specimens of *fasciatus* were preserved. The first was an adult breeding male collected June 15, 1932, at Igloo Creek. It had a great deal of white on the back. A female collected July 28, 1932, near Park Headquarters, had a relatively white back with some barring, while another female collected August 14, 1932, at McKinley Bar, was distinctly ladder-backed. The woodpecker is more in evidence in winter than during the summer when it is quiet.

One individual came daily, during the winter of 1931, to the Kantishna Ranger Station at McKinley Bar to be fed. Its visits were regular and punctual. This woodpecker works almost noiselessly as it flakes off scales of bark from the trunks of spruce trees in search of hiding insects. It is a regular breeder in McKinley region.

SAY'S PHOEBE

Sayornis saya saya [BONAPARTE]

GENERAL APPEARANCE.—A large phoebe with grayish-brown back and a blackish tail. The throat and breast are brownish gray. The under parts are rusty brown. The bill and feet are black. Length, 7.5 inches.

IDENTIFICATION.—The phoebelike habits of this bird combined with the rusty brown belly make it distinguishable from all other birds in the McKinley region.

DISTRIBUTION.—It breeds from central Alaska, northwestern Mackenzie south to southern California, Arizona, southern New Mexico and Sonora.

HABITS.—The Say's phoebe is a bird of the wide plains and canyons. In Mount McKinley National Park we saw this bird first at Savage River on May 20, 1926. At 8 o'clock in the evening it was in full song.

On June 5, 1926, a nest of this species was found in Savage River Canyon under an overhanging rock. It was placed 12 feet above the ground on a little shelf of rocks where it was well protected from rain and snow. Both birds were seen at the nest but incubation had not begun as yet.

On July 10, 1932, at the forks of the Toklat, I found a Say's phoebe's nest made of shed caribou hair. The hair had been gathered by the birds and packed down and felted into a firm nest. The nest was placed 6 feet above the ground under an overhanging cliff that projected out from the canyon wall. It contained five young which were fully fledged and nearly ready to leave the nest.

At Muldrow Glacier on July 16, 1926, in the willows growing along the bank of McKinley River we found a family consisting of the parents and five young, feeding on insects. On July 25, 1926, a male young of the year, fully fledged and foraging for himself, was collected and saved as a specimen.

Our investigations, both in 1926 and in 1932, showed that the Say's phoebe is a regular but not numerous breeder in the McKinley region.

WESTERN WOOD PEWEE

Myiochanes richardsoni richardsoni [SWAINSON]

GENERAL APPEARANCE.—A flycatcher of medium size with rather uniform coloration. It lacks the white or light-colored eye-ring found in many small flycatchers. The upper parts are brownish gray; the under parts are dark gray, becoming lighter on the throat and belly. Length, 6 inches.

IDENTIFICATION.—The flycatcher habits, uniform coloration and oft repeated harsh call note, "peé-ee", will identify this bird amongst all other birds in the McKinley region.

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DISTRIBUTION.—It breeds from central Alaska south to northern Lower California. It is found at McKinley Park Station.

HABITS.—The sole record that we have of this species is of one observed by me June 22, 1932. It was on a burned-over hillside on a warm south-facing slope near McKinley Park Station. It is believed to be a rare summer visitor to the McKinley area.

OLIVE-SIDED FLYCATCHER

Nuttallornis mesoleucus [LICHTENSTEIN]

GENERAL APPEARANCE.—A large chunky flycatcher nearly uniform dark brownish gray above. The throat is whitish; the sides are brownish separated by a whitish medial stripe. There are two white areas on the rump which show when the bird is in flight. Length, 7.4 inches.

IDENTIFICATION.—The chunky build together with the white areas on the rump, and this bird's habit of perching on the very tops of tall dead trees are all good field characters. However, the bird's loud and unmistakable call, "Who-be-you?", or as others record it, "Quick-three-beers" is the best means of identification.

DISTRIBUTION.—It breeds from central Alaska south in coniferous forests to northern Lower California, Arizona, New Mexico, and western Texas. It is also found in northern and eastern United States. In the McKinley region, it is found only at low elevations along streams.

HABITS.—On June 15, 1926, while I was passing through a dense spruce wood on Savage River, I heard the unmistakable and oft-repeated call of the olive-sided flycatcher. On this occasion I heard the call three times, but I was unable to locate the bird.

In 1932 I was more fortunate, for on June 2 I noted the first spring arrival at park headquarters. For several days I heard the well-known "Who-be-you" call notes of this species in a grove of mixed aspen and spruce, below the dog kennels. On July 26, 1932, I found a brood of young olive-sided flycatchers just out of the nest in the same locality. Although these youngsters were able to fly about freely, they depended upon their parents to catch and bring them food.

Our observations indicate that a few olive-sided flycatchers breed each year at low altitudes in McKinley National Park.

PALLID HORNED LARK

Otocoris alpestris arcticola [OBERHOLSER]

GENERAL APPEARANCE.—A ground bird about the size of a sparrow,

with distinct black and white marking on the crown, below and in front of the eye, and on the throat. The tail is black, the outer feathers being edged with white. The back of the head is pale pinkish brown, as is also the base of the tail. The hind toe has a long straight claw. Length, 7.8 inches.

IDENTIFICATION.—The slender black hornlike ear tufts, the black crescent on the throat, and this bird's ground-frequenting habits are all good field marks for horned larks. *Arcticola* is a large, pale, Alpine-Arctic form of the species.

DISTRIBUTION.—It breeds from Alaska and upper Yukon, south on the high mountains through British Columbia to Washington. We found this bird nesting only on the higher and drier ridges in the McKinley region.

HABITS.—On May 27, 1926, the first pair of horned larks was seen on a barren rocky slope at 4,200 feet altitude where the ground was still nearly all covered with snow. On June 16, 1926, at 3,400 feet altitude, on the Savage-Sanctuary divide, five pairs of horned larks were found on a barren, wind-swept gravel ridge. The males were in full song. The birds were evidently nesting. On June 24, 1926, a male horned lark was observed on a barren shale ridge at 4,200 feet near the head of Savage River.

On June 12, 1926, at Ewe Creek, I found a family of spotted young horned larks just out of the nest. They sought to escape capture by crouching motionless on bare gravel ridges covered with mottled black and white Nenana gravel. They would not fly unless almost stepped on.

On June 27, 1926, at the head of Savage River both young pipits and young pallid horned larks, just out of the nest, were found. On July 14, 1926, three adults and seven young horned larks were seen well up on Copper Mountain.

In 1932, on June 2, horned larks were found nesting high up on a rocky slope on Mount Margaret. Again birds of this species were observed at Sable Pass on July 18, when six pairs were noted.

Pallid horned larks are regular breeders in the McKinley region. Seemingly, they pay little attention to late spring storms.

BANK SWALLOW

Riparia riparia riparia [LINNAEUS]

GENERAL APPEARANCE.—A small swallow, dull brown above and white below with a distinct brown band across the breast. It has no irridescent green or blue on the back. Length, 5.2 inches.

IDENTIFICATION.—The rough-winged swallow is the only other species which is likely to be confused with the bank swallow. Both species nest in holes in clay or sandy banks. However, the bank swallows nest in colonies, while the rough-winged swallows nest in single pairs, or at most only a few pairs nest together.

As has been stated, a good field character for this bird is the narrow but distinct brown band across the breast. On the other hand, the whole throat and breast of the rough-winged swallow are gray.

DISTRIBUTION.—It breeds from Alaska and Quebec south to California, Arizona, Texas, Alabama, and Virginia.

HABITS.—This species is a common summer resident at low altitudes in the McKinley region. It nests in holes in banks usually overlooking a stream, pond, or small lake. Charles Sheldon (1930, p. 402) reports that the first spring arrival was noted May 18, at Toklat where it was a common breeding bird.

BARN SWALLOW

Hirundo erythrogaster [BODDAERT]

GENERAL APPEARANCE.—A large, graceful swallow with long deeply forked tail. This bird is dark steel blue above and rich reddish-chestnut below. The chestnut coloration is on the upper breast and throat. Length, 7 inches.

IDENTIFICATION.—Both the rich reddish under parts and the deeply forked tail are characters which will distinguish this species from all other swallows.

DISTRIBUTION.—It breeds from northwestern Alaska and Great Bear Lake south to Alabama and northern Mexico.

HABITS.—The first spring arrival of the barn swallow was noted by us on June 19, 1926, at Savage River. The bird was alone and was perched on a telephone wire near our cabin. In the spring of 1927, John and Paula Anderson reported that the first swallows reached Wonder Lake on June 10; and in 1929, the same observers state that the young barn swallows commenced to fly on July 10.

This species breeds in small numbers at Wonder Lake and in the Kantishna district of the McKinley region. Probably both the violet-green and the tree swallow will eventually be found breeding in the McKinley region.

ALASKA JAY

Perisoreus canadensis fumifrons [RIDGWAY]

GENERAL APPEARANCE.—A plain gray bird with soft fluffy feathers. It is about the size of a robin. The adult has a white forehead, face, and throat.

The young birds are darker than the adults and have an almost black head and neck. Length, 13 inches.

IDENTIFICATION.—The best field marks of the species are the uniform gray coloration and soft fluffy plumage. The bold nature of these birds also is characteristic of them.

DISTRIBUTION.—They are distributed throughout the wooded parts of Alaska, except along the coast region east and south of the Alaska Peninsula. They are found in all wooded areas in the McKinley region north of the Alaska Range.

HABITS.—The Alaska jay, sometimes called the moose bird, the camp robber, or the whiskey jack, is one of the avian residents that thrusts itself upon the visitor's attention. Charles Sheldon found these birds to be very tame. They learned to come to his camp for food whenever he called them and ate fearlessly out of his hand.

About March 20, while snow still covers the ground to a depth of 3 or 4 feet, the Alaska jays in the McKinley region commence to sing. Their singing marks the beginning of their nesting activities. The nests are made of sticks and are lined with caribou or mountain sheep hair, and are artfully concealed in the dense tops of spruce trees. These birds, which are tame and confiding at other times, become very shy and secretive at nesting time so that it is difficult to locate them. By the time the park is open to visitors —late in May—the young jays are fully grown and out of the nest. Thus, on May 20, 1926, a pair of Alaska jays and their brood of three bob-tailed young were found in a spruce grove on the Savage River.

On June 1, at Savage River, Wright and I watched a pair of Alaska jays being chased away from camp by a red squirrel. Every time a jay would alight in the top of a spruce tree near camp the squirrel would look up at the bird, select the proper tree, and would run up the tree and jump at the jay, driving him away. This was repeated many times. If the spruce trees were close together the squirrel would jump from one tree to the next. If this was not possible he would go down and run across on the ground climbing the tree the jay was in. After the squirrel had driven the jays away, we saw the former take a bit of food—old, discarded cheese—that he had kept hidden in the crotch of a tree. Then he carried it down the tree and hid it under an old rotten log.

There is considerable competition about the camps among the Alaska jays and red squirrels to see which will get the choicest bits of discarded table scraps.

On May 26, 1926, a robin was found trying to drive a jay away from its

nest. Investigation showed that the jay was doing his best to steal the robin's eggs.

In 1932, we found Alaska jays just about as numerous as they were in 1926. They congregate about the camps and cabins more in winter, when food is scarce, than they do in summer. This is a common and very early breeder in the McKinley region.

AMERICAN MAGPIE

Pica pica hudsonia [SABINE]

GENERAL APPEARANCE.—A large strikingly contrasted black and white bird with a long black tail. Length, 15 to 20 inches; the tail being more than half the total length.

IDENTIFICATION.—The black and white pattern, long tail, and vociferous nature of the magpie are all good field characters.

DISTRIBUTION.—It is distributed throughout western North America from the Alaska Peninsula and central Yukon south to New Mexico. In the McKinley region this bird is most frequently seen near road camps and cabins.

HABITS.—At the time that Charles Sheldon wintered in the McKinley region (1906–8), magpies were very rare. He reports (1930, p. 401) seeing only one magpie during his entire stay in the McKinley region. This lone bird may well have followed the kills of market hunters into the region. By 1926, 25 magpies were seen during 72 days spent in the McKinley region. In 110 days spent in this same area in 1932, I counted 132 magpies. In 1932, one to several pairs of magpies were found about each road camp and cabin in the park. The increase of magpies in the park is probably due to the increase of human habitations in the area. The refuse piles offer a food supply which helps tide the birds over severe winters when food for them is apt to be scarce.

On June 24, 1926, near the head of Savage River I watched a family of two adults and four nearly grown young magpies hunting ptarmigan chicks. As soon as the willow ptarmigan sighted the dangerous magpie, she gave a warning call but not before the magpie had rushed in and scattered the brood of young ptarmigan, which sought refuge under the clumps of dwarf willows. The magpie would then fly away apparently leaving the vicinity for good; however, it would sneak quietly back and hide in the willows where it kept close to the ground so that the parent ptarmigan could not see it. The magpie would then stop and listen intently with its head cocked on one side. When the ptarmigan chicks began to "peep" in an

effort to locate their parents, the magpie, still keeping hidden, would sneak along near or on the ground until it caught sight of a ptarmigan chick. Instantly the magpie would make a quick short combined run and flight, and picking the young ptarmigan up in its bill would carry the fluttering chick off to the waiting young magpies which quickly devoured it.

One bird in the region seemed to be able to beat off the attacks of the magpie. On May 23, 1926, near the upper end of Savage Canyon I found three magpies that were greatly excited. Presently one of the three flew out of the tree where they were. A militant Northwestern shrike was in vigorous pursuit. This shrike succeeded in driving all three magpies away from its nest one after the other.

NORTHERN RAVEN

Corvux corax principalis [RIDGWAY]

GENERAL APPEARANCE.—A large crowlike bird. It is entirely black and has long pointed wings. Its call is a hoarse "cruck." Usually just a single individual is seen but occasionally the birds are seen in pairs. Length, 22 inches.

IDENTIFICATION.—The large size, wedge-shaped tail, and all black color are good field characters for this bird. There are no crows in the McKinley region.

DISTRIBUTION.—It breeds from northwestern Alaska to northern Greenland and south to Washington, central Minnesota, and Virginia. It is found throughout the McKinley region particularly along the higher ridges and mountain crests.

HABITS.—The raven was formerly quite numerous in the McKinley region, but with the advent of white trappers into the area many of the ravens disappeared. In 1908, Sheldon (1930, p. 271) states: "A possible explanation may be that ravens may have been killed by poisoned baits put out by some of the few men in the Kantishna region." In 1926, we found ravens still scarce in this region but in 1932 they were more plentiful.

YUKON CHICKADEE

Penthestes atricapillus turneri [RIDGWAY]

GENERAL APPEARANCE.—A small bird with a distinctly black and white head and soft fluffy feathers. This long-tailed chickadee has a distinct and intensely black crown. The black throat is separated from the black crown by a broad white stripe that extends from the base of the bill along the side of the head below the eye. The tail is long and the outer margins

of the feathers are edged with white as are also the wing coverts. Length, 5.2 inches.

IDENTIFICATION.—The distinctly black crown distinguishes the Yukon from the Alaska chickadee, and the lack of any rufous on the flanks and under parts distinguishes this species from the short-tailed Hudsonian chickadee. The lack of any white stripe above the eye sets it off from the mountain chickadee.

DISTRIBUTION.—It breeds in northern Alaska, north and west of Cook Inlet. In the McKinley region it is found at lower elevations.

HABITS.—It is a rare species in the McKinley region; we have but one record, a specimen collected at Wonder Lake on October 22, 1926, by John and Paula Anderson, M. V. Z. No. 50558.

ALASKA CHICKADEE

Penthestes cinctus alascensis [PRAZAK]

GENERAL APPEARANCE.—A large chickadee with a long tail and grayish, instead of black, crown which distinguishes *alascensis* from *turneri*. The size is slightly larger than in *turneri* and the tail feathers lack any distinct white edging. Length, 5.5 inches.

IDENTIFICATION.—It is easily distinguished from the Yukon chickadee by the gray instead of the black crown, and from the Hudsonian chickadee by the lack of any red or rufous color on the flanks and belly.

DISTRIBUTION.—It is distributed throughout Siberia, and northern Alaska east to northwestern Mackenzie. In Mount McKinley National Park it is found well distributed in the aspen and spruce forests.

HABITS.—At Savage River Camp on July 25, 1926, a family of five Alaska chickadees consisting of an adult and four young was found. One of these, an immature bird, was collected, No. 49742. An adult male was also collected 2 days previously. People living in the region told us that these chickadees disappear in the spring and are rarely seen all summer, but that in the fall they again gather about the cabins to be fed.

HUDSONIAN CHICKADEE

Penthestes hudsonicus hudsonicus [FORSTER]

GENERAL APPEARANCE.—A small chickadee with a short tail, reddish flanks and under parts. Length, 5.1 inches.

IDENTIFICATION.—The small size and reddish under parts are the best field characters for this species.

DISTRIBUTION.—It breeds from the tree limit in northwestern Alaska and

central Mackenzie south to central Manitoba and Ontario. It is found near timber line in the spruce woods throughout the McKinley region.

HABITS.—This is one of the cheeriest and most inquisitive birds of the region. On June 3, 1932, I observed a Hudsonian chickadee carrying a bill full of caterpillars to its nest in an aspen grove near park headquarters. In 1926, this species was scarce. Only three individuals were seen all summer, whereas, in 1932 it was a species which was commonly seen in the area. Two specimens were collected and fully fledged young just out of the nest were observed June 23, 1926. It is a regular breeding species in the McKinley region.

ROCKY MOUNTAIN CREEPER

Certhia familiaris montana [RIDGWAY]

GENERAL APPEARANCE.—A small, brown bird, evenly striped above with brown. The lower parts are white. The bill is long and slightly curved. This bird has a long tail of stiff, pointed feathers. Length, 5.6 inches.

IDENTIFICATION.—The slender, curved bill, pointed tail feathers, brown color, and its habit of creeping slowly up trunks of trees—these are the best field characters for this species.

DISTRIBUTION.—It breeds from Mount McKinley and central British Columbia south along the Rocky Mountains to Arizona and New Mexico.

HABITS.—Our sole record for this species is based upon a male bird collected October 21, 1907, by Charles Sheldon in the spruce woods near his winter cabin on the Toklat River. Sheldon states that this speciman was the only bird of this species observed. At best it is probably only a rare visitor to the McKinley region.

EASTERN ROBIN

Turdus migratorius migratorius [LINNAEUS]

GENERAL APPEARANCE.—The reddish breast and cheerful song of the robin are so well known that a detailed description of this bird is not needed. Young robins have black spots on their breasts. Length, 10 inches.

IDENTIFICATION.—The rollicking song, the reddish breast of the adults and distinct black spots on the breasts of the young robins are diagnostic. In life the Eastern robin may be distinguished from the Western robin by the conspicuous white spots at the tip of the outer tail feathers.

DISTRIBUTION.—It breeds from northwestern Alaska south and east to Kansas, Ohio, and Massachusetts. It is found nesting throughout the

McKinley region in spruce forests, and even above timber line in low Alpine-Arctic willows.

HABITS.—The robin is one of the first spring arrivals in the McKinley region. Charles Sheldon noted the first robin at Toklat on May 3, 1908. At Wonder Lake on the morning of May 4, 1929, the first robin was seen at 11 o'clock. Upon our arrival in 1926, we found robins common on May 19. In 1932, we found robins present and already building nests on May 15. On May 29, 1926, a robin's nest was found completed and containing four eggs. Other nests containing eggs were found that season as late as June 24. In the spring of 1929, the first young robins were found on June 3; and in 1926, young robins just out of the nest were observed on June 23.

In 1932, nesting robins suffered continually because of the late spring snowstorms. A heavy wet snowfall of 6 inches which fell on June 14 destroyed many sets of eggs. After two unsuccessful attempts at nesting in open willows some of the robins made a third and successful attempt by placing their nests on the ground under overhanging banks. Two robins' nests were thus located under cut banks of the main highway and both succeeded in rearing broods of young late in the season.

NORTHERN VARIED THRUSH

Ixoreus naevius meruloides [SWAINSON]

GENERAL APPEARANCE.—A bird of the same build and about the size of a robin, but with a distinct black collar across the breast which is deep orange instead of brick red as in the robin. The varied thrush has a reddish eyebrow line and two bars across the wing both of which characters are absent in the true robin. Length, 10 inches.

IDENTIFICATION.—The wing bars, eyebrow line, and particularly the black bar across the orange breast are the outstanding field characters of the varied thrush which is only likely to be confused with the robin.

DISTRIBUTION.—It breeds from Kowak Valley, Yukon Delta, and Mackenzie Delta south to Prince William Sound, and in the mountains south through eastern British Columbia to Montana and Oregon. It is found in the McKinley region at low elevations in the deep spruce woods.

HABITS.—Charles Sheldon (1930, p. 403) reports the Northern varied thrush as a common summer resident which breeds in Mount McKinley National Park. He saw the first spring arrival on May 15, and the species was last seen in the fall on October 7. Sheldon also reports that by May 24, the voice of the varied thrush was heard constantly in the evening and occasionally during the day.

We did not encounter this species at all in the McKinley region in 1926. However, it was fairly common there in 1932, when the first spring arrival was noted at Park Headquarters on May 18. An adult male was collected at this locality on May 31, 1932, but after that date the birds became scarce and the species was observed but once, June 26, until August 21, when a varied thrush passing southward was observed at McKinley Bar where no birds of this species had been present earlier in the summer. No positive evidence of breeding in the form of eggs, nests, or young birds, could be found.

ALASKA HERMIT THRUSH

Hylocichla guttata guttata [PALLAS]

GENERAL APPEARANCE.—A small, trim, tawny brown elf with a white breast heavily spotted with dark brown dots and a short stubby reddish tail. Length, 7 inches.

IDENTIFICATION.—The small size and the distinctly dull red or rusty tail are the best "sight" field characters of this species; and the flutelike song, suggestive of sacred music heard at evening, also identifies this bird.

DISTRIBUTION.—It breeds from central Alaska south to Cross Sound and northern British Columbia. It is found breeding in the lower wooded sections of the McKinley region.

HABITS.—Charles Sheldon (1930, p. 403) reports this species as arriving at Toklat, where it breeds, on May 26. We secured a female as a specimen at Park Headquarters on May 31, but this specimen was destroyed later by a red squirrel.

It is our experience that this is the rarest of the thrushes in the McKinley region.

OLIVE-BACKED THRUSH

Hylocichla ustulata swainsoni [TSCHUDI]

GENERAL APPEARANCE.—A thrush with an olive or tawny back. The tail is the same color as the back. The breast and lower parts are white, heavily spotted with brown. Length, 7.2 inches.

IDENTIFICATION.—The olive-backed thrush may be distinguished from the Alaska hermit thrush by the tail which is olive-colored instead of rusty or reddish; and from the gray-cheeked thrush by the cheeks and sides of the head which are distinctly tawny, or ocherous, instead of grayish.

DISTRIBUTION.—It breeds from northwestern Alasks and Mackenzie south to California, Utah, Colorado, Michigan and in the mountains to Pennsyl-

vania and West Virginia. It is found in the dense spruce woods in the McKinley region.

HABITS.—This thrush is a retiring bird. It is often heard singing at night. I sighted this species first on May 31, 1932, at Park Headquarters when a male was collected. Sheldon reports that the birds kept singing all night during the nesting season and that the first arrival appeared on May 12. It is a common breeder in the McKinley region.

GRAY-CHEEKED THRUSH

Hylocichla minima aliciae [BAIRD]

GENERAL APPEARANCE.—A larger thrush than the hermit and olive-backed thrushes. Its back and tail are of a uniform grayish-olive color without any rusty color. Length, 7.5 inches.

IDENTIFICATION.—The lack of any rusty or red color on the tail distinguishes this species from the hermit thrushes in the field. Although the back and tail are of uniform color as in the olive-backed thrush, the cheeks and the sides of the neck are clear gray without any tawny or buffy ground color, as in *swainsoni*.

DISTRIBUTION.—It breeds from northeastern Siberia through northwestern Alaska to northern Manitoba and central Quebec and Newfoundland. It is restricted to deep spruce woods in the McKinley region.

HABITS.—In the field this thrush is likely to be confused with the olive-backed thrush, which probably accounts for Sheldon not mentioning it in his list of birds of the Mount McKinley region. We found it a regular summer visitor in the park. We first found this species on June 3, 1926. Wright saw three individuals in a dense spruce wood. One of these was collected on June 4. In 1932, the first spring arrival was collected on May 31. No nests were found and the species was rarely seen after June 5.

EUROPEAN WHEATEAR

Oenanthe oenanthe oenanthe [LINNAEUS]

GENERAL APPEARANCE.—A bird about the size of the common bluebird to which it is allied, and which it resembles closely in flight and in feeding habits. The top of the head and back are clear gray with a rusty overwash. The wings and tail are brown. The throat and stripe above the eye are white and it has a broad black stripe which extends from the base of the bill through and below the eye. The under parts and base of tail are creamy white. Length, 6 inches.

IDENTIFICATION.—The bluebird appearance of this bird and the broad white spot at the base of the tail, which is conspicuous when the bird takes flight, are the two best field characters of the species.

DISTRIBUTION.—The European wheatear breeds from the British Isles and Central Europe east to northern Alaska, south to the mouth of the Yukon and high up in the mountain passes above timber in the Mount McKinley region. It winters in India and in eastern Africa.

HABITS.—We first met this Asiatic straggler in the McKinley region on May 29, 1926, when a male bird in breeding condition was collected high up on the mountain side 1,000 feet above timber line. This bird was one of a pair that hopped around and explored a rock pile in a rock-wrenlike manner. The male was repeatedly seen to enter a narrow crevice in a rocky outcrop. We believed that the birds were nesting there but we were unable to reach the nest, the crevice was so narrow. On July 14, 1926, at Copper Mountain, I collected a young bob-tailed wheatear just out of the nest and barely able to fly. This young bird was in the speckled plumage which is similar to that of a young bluebird. However, the feathers of the wings and back were edged with brown. The white rump patch was as conspicuous in the immature bird as in the adult.

In 1932 I found wheatears more numerous than they had been in 1926. Nesting pairs were seen at Sable Pass, Savage Canyon, and near Double Mountain. On July 25, 1926, two families of wheatears were seen at Copper Mountain. The young were almost full grown. On August 24, 1932, at Highway Pass several families of wheatears were seen along the highroad which was then under construction. The broad white patch at the base of the tail was conspicuous. Except for a certain drabness of color and ungroomed appearance, the young were similar to the adults.

TOWNSEND'S SOLITAIRE

Myadestes townsendi [AUDUBON]

GENERAL APPEARANCE.—A thrushlike bird slightly smaller and more slender than a robin. The general color of the bird is gray, except for the partly concealed tawny spots near the middle of the wing and for the outer tail feathers which show white when the bird is in flight. Length, 8 inches.

IDENTIFICATION.—Its beautiful song; the slender form and uniform gray color; the white outer tail feathers, and the white eye-ring of this bird are all good field characters.

DISTRIBUTION.—It breeds from Mount McKinley south through the

Rocky Mountains to Arizona and New Mexico, and through the Sierra Nevada to the mountains of southern California.

HABITS.—This long-tailed gray bird is usually found in remote mountain districts. In the McKinley region it is rare and is most likely to be found near cliffs or in the canyons of the larger streams where it builds its nest under overhanging banks.

In 1926 our first acquaintance with the solitaire was on July 9, when a young bird just out of the nest was collected at Igloo Creek. In 1932 on May 26, a pair of solitaires was observed in a canyon, and on July 28, a single individual was noted at Igloo Creek. This total of only four individuals was seen in two seasons.

KENNICOTT'S WILLOW WARBLER

Acanthopneuste borealis kennicotti [BAIRD]

GENERAL APPEARANCE.—A bird similar in size and with general habits of the warbling vireo. About its nest it is a loud incessant singer. The upper parts of this bird and the tail are dull greenish. The under parts are creamy yellow and it has a distinct yellow stripe above the eye. Length, 4.5 inches.

IDENTIFICATION.—The yellow stripe above the eye, the incessant song, and the general warbling vireo characters are the best field marks for the species.

DISTRIBUTION.—It breeds in western Alaska and winters in southeastern Asia.

HABITS.—This bird and the European wheatear are two species of land birds that cross the Pacific Ocean twice each year, traveling to their breeding grounds in Alaska and returning to winter in India and Africa. It is probable that the birds reach Alaska by following the Aleutian chain of islands from Asia to North America. Kennicott's willow warbler was a fairly common breeding bird on the upper Savage River in 1926. Here, on June 20, we found half a dozen willow warblers singing in one tract of spruce woods. The song might well be described as intermediate between that of the orange-crowned and northern pileolated warblers. Two of these birds were seen to perch on a limb fluttering their wings quite audibly and uttering a harsh "chit" at frequent intervals.

Three specimens were collected in June 1926, and two proved to be adult males in full breeding condition.

In 1932 I repeatedly visited the exact locality where these warblers had been found in 1926, but I neither saw nor heard them. All summer a

continued search was carried on in the McKinley region but not a single willow warbler could be found. The late heavy snows had apparently prevented their reaching this inland district.

This is an Old World warbler related more closely to the kinglets than to the American wood warblers with which Americans are most familiar. Unlike the European wheatear, the willow warblers breeding in Alaska are regarded as a distinct race (*kennicotti*).

EASTERN RUBY-CROWNED KINGLET

Corthylio calendula calendula [LINNAEUS]

GENERAL APPEARANCE.—The kinglets are the smallest birds found in the McKinley region. They have short rounded bodies, short tails, and short straight bills. Their general color is dull olive green above, lighter below, with a brilliant red crown patch on the top of the head. The males are incessant singers and they produce a song which seemingly could not possibly come from so small a bird. Length, 4 inches.

IDENTIFICATION.—The song, the small size, the greenish color, and particularly the bright red crown patch are the best field characters of this bird.

DISTRIBUTION.—It breeds from northwestern Alaska south to central New Mexico and southern Arizona. It is found throughout the spruce belt in the McKinley region.

HABITS.—Charles Sheldon found this bird to be a common summer visitor. He noted the first spring arrival on April 29. On June 4, 1932, at Park Headquarters, just after several inches of snow had fallen and the storm had abated, I heard a ruby-crowned kinglet in a dense spruce wood in full song. The breeding song is unmistakable.

In our experience this bird is a rare breeder in the McKinley region.

AMERICAN PIPIT

Anthus spinoletta rubescens [TUNSTALL]

GENERAL APPEARANCE.—A slender grayish ground-inhabiting bird with fine breast streaks of brownish-gray. It has a slender warbler-like bill and a long claw on the hind toe. It is similar in habits and in general outline to the horned lark. Length, 6.38 inches.

IDENTIFICATION.—It lacks the black ear tufts and black facial and throat markings of the horned lark yet it is similar to it.

DISTRIBUTION.—It breeds in the Arctic Zone from Siberia, northern

Alaska, and Greenland south to Oregon, Colorado, and New Mexico. It is found in the higher passes throughout the McKinley region.

HABITS.—On May 20, 1926, high up amid the vanishing snowfields on a rocky barren ridge at 4,000 feet, we watched a male pipit in full nuptial flight. It perched on a rock, then flew almost vertically into the sky for a distance of from 50 to 150 feet, singing a single note which was repeated constantly. Then with legs extended, feet spread out, and tail sticking upwards at a sharp angle, this male bird sang steadily as he fluttered his wings and floated down like a falling leaf, usually landing near the place from whence he began his flight.

On June 18, 1932, at Sable Pass, I examined a pipit nest that contained five eggs. Incubation had just begun. This nest was placed on the ground under a shelving overhanging bank and was made of fine grass blades and plant fiber.

On June 27, 1926, at the head of Savage River, we found a young bob-tailed pipit just out of the nest. As it was scarcely able to fly we caught it easily.

At 5,000 feet altitude near Anderson Pass and the Muldrow Glacier we found three pipits feeding with two Hepburn's rosy finches at the edge of a melting snowbank on July 15, 1926.

This species breeds throughout the McKinley region in the mountain passes and along the barren ridges high above timber line. They appear to be but slightly discouraged from breeding because of heavy snowfall and late spring snowstorms. Since they place their nests under protecting rocks they are independent of the weather to a certain degree. They are regular and common breeders in Mount McKinley National Park.

BOHEMIAN WAXWING

Bombycilla garrula pallidiceps [REICHENOW]

GENERAL APPEARANCE.—A plump, neat appearing, brownish-gray bird similar in general appearance but larger than the well-known cedar waxwing. This bird has a decided crest; a black stripe through the eye, and white spots forming a white bar on the wing. The tail is short and tipped with a broad yellow band. Length, 8 inches.

IDENTIFICATION.—This species may be distinguished from the cedar waxwing by its greater size and the chestnut-colored area on the forehead and at the under base of the tail. Too, the abdomen is grayish instead of yellow. Both species of waxwings usually, but not always, have red wax-like tips on the shorter wing feathers.

DISTRIBUTION.—The Bohemian waxwing breeds from western Alaska, Mackenzie, and Manitoba south to southern British Columbia and southern Alberta. It is found in the spruce woods in Mount McKinley National Park.

Habits.—The earliest spring arrival of this species was noted by me on May 24, 1932, at the boundary cabin on Savage River where a mated pair of Bohemian waxwings was found in a sheltered grove of spruce trees. From the actions of these birds it seemed likely that they would nest in the near vicinity.

On June 19, 1932, I found a pair of Bohemian waxwings gathering nest material in a small clump of spruce trees on the Nenana River near McKinley Park Station. *Sheperdia* bushes grew abundantly near this spot assuring an abundant food supply of berries for the nestlings. In fact, the whole ecological niche needed for nesting was present.

On June 25, 1926, Wright collected a pair of breeding Bohemian waxwings on Savage River. The female of this pair had the bare flabby breast of an incubating bird and her ovaries indicated she had recently laid eggs

On July 26, 1932, I saw a family of young just out of the nest at Park. Headquarters. At McKinley Bar from August 21–24, 1932, between 10 and 30 Bohemian waxwings were seen daily feeding on *Sheperdia* berries in the spruce woods. One immature female not long out of the nest was collected at this locality on August 14. It was found to lack the red wax tippings that are usually present on immature male birds of this species. Our field investigations show that the Bohemian waxwing nests regularly in the lower dense spruce woods of the McKinley region.

NORTHWESTERN SHRIKE

Lanius borealis invictus [GRINNELL]

GENERAL APPEARANCE.—A bird about the size of a robin with raptorial habits. The strong black bill is notched and plainly hooked at the end. This bird has a black band through the eye. The head and upper parts are clear gray while the outer tail feathers are strongly edged with white which shows plainly when the bird is in flight. Length, 10.32 inches.

IDENTIFICATION.—Good field characters for the shrike are its coloration which is pronounced black, gray, and white; its method of perching upright on barren exposed dead limbs and tree tops, and its direct bullet-like flight. The large size of this bird and the fine wavy dark lines across the breast and under parts distinguish the Northwestern shrikes from the smaller shrikes breeding in the United States.

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DISTRIBUTION.—It breeds from Mount McKinley and northwestern Alaska south to northern British Columbia, Alberta, and Saskatchewan. It is found throughout the McKinley region, being most abundant at or near timber line.

HABITS.—Charles Sheldon noted the earliest spring arrival of this bird on the Toklat on April 26, 1908. In May 23, 1926, in Savage River Canyon we saw a shrike vigorously attack and pursue a magpie. On June 10, 1926, I shot a male Northwestern shrike that flew by carrying some large object in its claws. One shot pierced the shrike's brain so that it fell headlong, rolling over and over on the ground, but it still rigidly grasped the prey in its claws, which upon examination proved to be—not a mouse—but a fledgling robin which the shrike had evidently stolen out of the robin's nest, for it was too young to fly.

On June 22 at Savage River foothills a family of young shrikes just learning to fly was noted by Wright. They hovered over various objects and kept calling back and forth to each other. On July 1 a family of four fearless young shrikes was noted, and on July 10, 1926, a family of six young shrikes which were well able to fly was noted at Igloo Creek.

In 1932 I found shrikes about twice as numerous as they had been in 1926, and following the breeding season large families consisting of from four to six young shrikes were frequently seen in the late summer.

This species is a common breeding bird in the McKinley region where it is one of the earliest spring arrivals.

ORANGE-CROWNED WARBLER

Vermivora celata celata [SAY]

GENERAL APPEARANCE.—A warbler of medium size without conspicuous markings. It is gray-green above and yellowish beneath. The orange-colored crown patch, which gives the species its name, in life is usually covered and concealed by the tips of the feathers of the crown. Length, 5 inches.

IDENTIFICATION.—The gray-green upper parts, the yellow under parts, and the lack of any distinct color markings are the best field characters.

DISTRIBUTION.—It breeds from Kowak River, Alaska, southeast to northern Manitoba.

HABITS.—Our experience both in 1926 and in 1932 leads us to believe that the orange-crowned warbler which Wright saw in a spruce wood on Savage River on May 21, 1926, at 2,800 feet altitude, was merely a late migrant passing through the McKinley region to its breeding ground

farther north in the Yukon Valley. Repeated search in the McKinley region, both in 1926 and in 1932, failed to reveal any breeding birds of this species in the park in summer.

ALASKA YELLOW WARBLER

Dendroica aestiva rubiginosa [PALLAS]

GENERAL APPEARANCE.—A small warbler. The head and under parts are rich yellow, and the back is greenish. The breast of the male is streaked with fine rufous markings. The female and young birds are duller yellow and usually lack the rufous breast markings of the male. Length, 5 inches.

IDENTIFICATION.—The uniform yellow color is the best field character of these birds in summer.

DISTRIBUTION.—They breed in the Canadian zone, throughout most of Alaska and south to Vancouver Island, British Columbia.

HABITS.—An adult female Alaska yellow warbler was collected by Wright on June 1, 1926, on Savage River at 2,800 feet elevation. From our experience both in 1926 and in 1932 we believe that this warbler may breed in Mount McKinley National Park.

MYRTLE WARBLER

Dendroica coronata [LINNAEUS]

GENERAL APPEARANCE.—A warbler of medium size. It has a white throat and conspicuous yellow patches on the crown, rump, and side between the flank and throat. Length, 5.6 inches.

IDENTIFICATION.—This species is similar to the well-known Audubon warbler except that the myrtle warbler always has white instead of yellow throat markings.

DISTRIBUTION.—It breeds from northwestern Alaska, Mackenzie, and northern Manitoba south to British Columbia, Michigan, and the New England States. It is found in the McKinley region, chiefly among the cottonwoods which grow along the streams.

HABITS.—Charles Sheldon reports the first spring arrival of this bird on May 9. He found it to be the most abundant of the warblers on the Toklat. They were first observed by me on May 19, 1932. From one to six of the birds were seen daily during the week following. On July 1, 1926, Wright found a female myrtle warbler feeding a young bob-tailed warbler which was just out of the nest. The male parent was also present and was observed feeding other youngsters of this brood. At Savage River on July 25, 1926, Wright collected a juvenile of this species. In 1932

the species was common during the spring migration and then was rather rarely seen until the young of the year began to appear in July.

It is the most abundant warbler in the McKinley region.

BLACK-POLL WARBLER

Dendroica striata [FORSTER]

GENERAL APPEARANCE.—In the spring the male black-poll warbler is a distinctly black and white bird. The entire top of the head is intensely black. The sides of the head and the throat are white. The breeding female is quite unlike her mate; she is greenish in coloration on the head and back with yellowish under parts. Length, 5.5 inches.

IDENTIFICATION.—The solid black crown and the white patch on the throat and side of the head will distinguish the breeding male. The greenish female is highly streaked with black on the sides of the throat and the flanks.

DISTRIBUTION.—It breeds from northwestern Alaska to Quebec and south to Michigan, Maine, and New York. It is probable that only migrants occur in the McKinley region.

HABITS.—Our sole record for this species is based on Charles Sheldon's record of June 3, 1908. He saw a flock feeding in the woods at Toklat.

GRINNELL'S WATER-THRUSH

Seiurus noveboracensis notabilis [RIDGWAY]

GENERAL APPEARANCE.—This bird sometimes is aptly called "wag-tailed warbler." It is a true warbler with woodland ground-haunting habits. The upper parts are uniform brown, while the light buffy under parts are heavily streaked with dark brown. It has a distinct buffy line extending over and through the eye. Length, 6.04 inches.

IDENTIFICATION.—The ground-dwelling habits, the heavily streaked under parts, and the distinct whitish line through and above the eye are the best field characters for this bird.

DISTRIBUTION.—It breeds from northwestern Alaska, Mackenzie, and Manitoba south to British Columbia, Montana, Minnesota, and Michigan.

HABITS.—This bird has the general appearance in life of a small woodland thrush. At McKinley Bar on August 16, 1932, I noted a brown streaked bird which flew out of a brush pile and alighted for a moment on a dead log. The next day I collected another, or perhaps the same bird, at this identical spot. This is our only record for the species in Mount McKinley National Park.

NORTHERN PILEOLATED WARBLER

Wilsonia pusilla pileolata [PALLAS]

GENERAL APPEARANCE.—A small spritely warbler with greenish-yellow upper parts and bright yellow under parts. The top of the head is velvety black, and the forehead is golden yellow. In the female the crown patch is restricted and brownish, or absent entirely, but a vague yellowish eyebrow stripe is characteristic. Length, 5 inches.

IDENTIFICATION.—The bright yellow color; small size; black cap, or the yellow eyebrow line when the cap is absent, are the outstanding field characters.

DISTRIBUTION.—It breeds from northern Alaska south to the mountains of New Mexico and central Texas.

HABITS.—Charles Sheldon noted the first spring arrival of this species on May 20, 1908. He states that it is a common summer resident on the Toklat. It was observed by us repeatedly late in May 1926. The first spring arrival in 1932 was noted by me on May 21, and it was seen regularly all through the remainder of May. No nest or young birds were found, but this is probably one of the regular breeding birds of the McKinley region.

AMERICAN REDSTART

Setophaga ruticilla [LINNAEUS]

GENERAL APPEARANCE.—A warbler with striking black and salmon coloration. The adult male has a black head, neck, and back. The sides of the breast and flanks are reddish-orange. It has a salmon-colored bar on the wings and tail. The salmon coloration of the male is replaced by yellow markings on the female and the black is replaced by gray. Length, 5.5 inches.

IDENTIFICATION.—The vivid black and orange color of the male, and the gray and yellow of the female are distinctive field characters.

DISTRIBUTION.—It breeds from northern British Columbia, Mackenzie, and Quebec south to Oregon, Colorado, Arkansas, Alabama, and Georgia.

HABITS.—On July 25, 1926, a male bird of this species was watched by several members of the National Park Service who saw it at close range in the willows near the head of Savage River. This is our only record for the species in the McKinley region. None was found there in 1932.

RUSTY BLACKBIRD

Euphagus carolinus [MÜLLER]

GENERAL APPEARANCE.—A medium-sized blackbird, the eyes in both sexes being straw-colored. The body is all glossy black or black washed with rusty. Length, 9.5 inches.

IDENTIFICATION.—Distinctive characters of the rusty blackbird are the light straw-colored eyes in both sexes; the greenish instead of purple reflection in the male, and the light eyes and faint traces of rusty on the breast and back of the female distinguish the species from Brewer's blackbird.

DISTRIBUTION.—It breeds from Kowak River, Alaska, east and south to northern Maine, New Brunswick, and Nova Scotia.

HABITS.—According to John and Paula Anderson's report, on May 5, 1929, the first male blackbird was seen at Wonder Lake at 5 p. m. Charles Sheldon reports the first spring arrival on May 10, 1908. In 1927 the first male of this species was seen at Wonder Lake at 3 p. m. on May 10; the female birds were seen the next day.

This bird was found at Wonder Lake on July 18, 1926, when an adult female was collected, and again on August 14, 1932, when an adult male was seen. On July 27, 1926, 3 miles below Savage River Canyon, we saw a family of four young rusty blackbirds and their parents fly across Savage River.

This bird is a regular breeder in the McKinley region.

ALASKA PINE GROSBEAK

Pinicola enucleator alascensis [RIDGWAY]

GENERAL APPEARANCE.—A bird nearly as large as a robin, with a dark thick short bill. The general body color is dull gray but the adult male is strongly suffused with bright scarlet on the head, breast, wings, and back. The females and young birds of both sexes are yellow on the head and rump. Length, 9 inches.

IDENTIFICATION.—The thick dark bill and the bright scarlet of the male, and the yellow hue of the female and young are the best field characters. These birds are prone to choose exposed perches in the very tops of spruce trees.

DISTRIBUTION.—It breeds from Mount McKinley, northwestern Alaska, and Mackenzie south to northern British Columbia.

HABITS.—The Alaska pine grosbeak is one of the hardy songsters of the north. Although there is a general southward movement of the birds, many of them winter throughout the interior of Alaska. Charles Sheldon

did not see any on the Toklat during the winter from November 7, 1907, to March 12, 1908.

This bird is common in the McKinley region during the spring and fall migrations but we have been unable to find it breeding there.

HEPBURN'S ROSY FINCH

Leucosticte tephrocotis littoralis [BAIRD]

GENERAL APPEARANCE.—A large finch with a body of seal brown color washed with bright rose on the wings, rump, flanks, and abdomen. The head is gray and has a black crown patch. Length, 6.1 inches.

IDENTIFICATION.—The best field characters for this bird are its coloration—brown with a rosy wash—together with its habit of living and nesting high above timber line amid cliffs, broken rock slides, and snowbanks.

DISTRIBUTION.—It breeds above timber line in mountains from the Alaska Peninsula and Mount McKinley south to central Oregon. It is common in the cliff regions high above timber line in the vicinity of Mount McKinley National Park.

HABITS.—When Superintendent Liek and his party climbed Mount McKinley in April 1932, the birds which were found living farthest up on this "highest mountain in North America" were rosy finches. They were observed flying overhead and toward the cliffs at a point slightly above 7,500 feet elevation.

Sheldon reports the earliest spring arrival at the Toklat on May 3, 1908. On May 27, 1926, I found a pair of rosy finches feeding on weed seed where a few bare places were beginning to appear in the snow on Mount Healy at 4,200 feet. Examinations of the crop contents of two specimens collected showed an exclusive vegetable diet. This was a mated pair of birds apparently about to nest, since the female contained an egg that would have been laid within 2 or 3 days. Another female collected June 6, 1926, contained an egg fully formed and ready to lay.

On June 12, at Double Mountain high above timber line I observed two pairs of rosy finches entering cracks in conglomerate cliffs. Both of the vivid red males were vibrant with their bubbling mating song. One of the birds made repeated trips into a nest crevice carrying nest material which consisted of dry plant stems.

On June 28, 1926, rosy finches were found nesting in the cliffs on the snowy summit between Riley Creek and Savage River.

This bird is a regular breeding species in the McKinley region and its nesting seems to be but slightly retarded by cold, snow, and other adverse weather conditions.

COMMON REDPOLL

Acanthis linaria linaria [LINNAEUS]

GENERAL APPEARANCE.—A small finch with a short, sharp bill. Its back and flanks are streaked with brown and ashy, and it has a crimson crown cap. The adult male has a rosy breast. The females have the crimson crown patch and the black chin spot of the male but they lack the rosy breast of the male. Length, 5 inches.

IDENTIFICATION.—The small size, the streaked plumage, the red crown patch, and the black chin spot are the outstanding field characters of this bird.

DISTRIBUTION.—In North America it breeds from northwestern Alaska and Mackenzie south to Alberta and Manitoba and is resident in the willow areas throughout the McKinley region.

HABITS.—Charles Sheldon (1930, p. 402) states that the redpolls were seen in the Toklat area throughout the year but that few birds remained at timber line in winter. About April 15 they return to timber line and remain there to breed.

On May 21, 1926, I found three mated pairs of redpolls on Savage River. They were foraging in a willow thicket along the margin of a shallow pool in the river bed. Two of these birds were collected for specimens and their throats were found to contain many weed seeds.

On June 1, 1926, I found a redpoll's nest 5½ feet above the ground in the crotch of a willow. The female was flushed from the nest which was found to contain two fresh eggs. When it was visited again on June 7, the nest contained a full set of five eggs. It was composed of plant fiber and weed stalks and measured 4 inches across and 3½ inches in depth—outside measurements. The inside measurements of this nest were 2½ by 1¾ inches, with a depth of 1½ inches. It was lined with white ptarmigan feathers.

A second redpoll nest was found within a quarter of a mile of the first nest. It was also placed in the crotch of a willow and was a bulky affair profusely lined with white ptarmigan feathers which made it conspicuous even at a distance.

Redpolls were as common in 1932 as they were in 1926. A sharp watch was kept for the hoary redpoll but none was found; the common redpoll is the breeding bird in the McKinley region.

WESTERN SAVANNAH SPARROW

Passerculus sandwichensis alaudinus [BONAPARTE]

GENERAL APPEARANCE.—A small grass-inhabiting sparrow. It is striped above with brown and ashy, and below with sharp brown streaks on the breast and flanks and in some instances on the throat. It has a distinct yellow stripe on the side of the head in front of the eye above, as well as on the bend of the wing. Length, 5.6 inches.

IDENTIFICATION.—The small size, streaked breast, and yellow line over the eye are the best field marks of this species.

DISTRIBUTION.—It breeds from the Arctic coast of Alaska and Mackenzie south to British Columbia and Alberta. It is found in the McKinley region in the open, grassy meadows above timber.

HABITS.—The Western Savannah sparrow is a retiring bird. It keeps well hidden in the grass and may therefore be easily overlooked unless especially sought.

On June 12, 1932, I saw several of these birds and collected one specimen high up on a snow-covered meadow on Double Mountain. On Savage River, on July 7, 1926, I collected a bobtailed young Savannah sparrow just out of the nest. At the time this fledgling bird was thought to be a young tree sparrow because a pair of adult tree sparrows were flying distractedly about and making every effort to lead me away. No adult Savannah sparrows could be found in the locality where the young bird was found during the entire summer, and it was only when detailed comparisons were made later at the museum that the correct identification was established.

This species was found on July 19, 1926, near Muldrow Glacier at which time a single individual was encountered. It is not an abundant bird in the McKinley region but it breeds there regularly in small numbers.

SLATE-COLORED JUNCO

Junco hyemalis hyemalis [LINNAEUS]

GENERAL APPEARANCE.—The head and neck of the male of this well-known species is black, and that of the female is dark slate-colored like the bird's back. The under parts are white, and the bill is flesh-colored. The tail is dark except for the outer tail feathers which show white when the bird takes flight. Length, 6.2 inches.

IDENTIFICATION.—The white outer tail feathers which are so conspicuous in flight and the dark gray or black head and neck of the birds are the two best field marks.

DISTRIBUTION.—The slate-colored junco breeds from Point Barrow, Alaska, northern Mackenzie, Manitoba, and Quebec south to Mount McKinley, British Columbia, Minnesota, Michigan, Maine, and in the mountains of Massachusetts, New York, and Pennsylvania. It is found in the timbered sections throughout the McKinley region.

HABITS.—Charles Sheldon found this bird to be a common summer resident at Toklat where the first spring arrival was noted and a male was collected on April 30, 1908.

In 1932 juncos were numerous at headquarters when we arrived on May 15; a few were seen nearly every day throughout the summer. On June 10, 1926, an incubating female was collected in the spruce woods at 2,800 feet, on Savage River. At this same location on July 25, 1926, many streaked young of the year were seen. These birds were still in the family circle, accompanied by their parents. On the same date many of the adult birds were bobtailed, having lost their tail feathers by molt. The flight of such birds was very uneven and was usually only from one bush to another nearby bush.

By September 1, 1932, the juncos in the region were abundant since they breed regularly in the spruce woods of Mount McKinley National Park.

WESTERN TREE SPARROW

Spizella arborea ochracea [BREWSTER]

GENERAL APPEARANCE.—This bird is slightly smaller than a song sparrow but is redder above. The crown is brownish red; the breast is grayish with a single large brown spot in the center. The upper half of the bill is dark; the lower half is mostly yellow. Length, 6.3 inches.

IDENTIFICATION.—The white wing bars; the brownish-red cap; the ashy-gray throat, and the large dark spot in the center of an evenly colored breast are the best field characters.

DISTRIBUTION.—It breeds from Bering Sea and Point Barrow east to the Anderson River, and south in the mountains to northern British Columbia. It is the commonest passerine bird in the Mount McKinley region where it is abundant at timber line.

HABITS.—Sheldon reports the first spring arrival on April 26, 1908. In 1929 the first tree sparrows reached Wonder Lake on May 6, at 11 a. m., according to the observations of Mr. and Mrs. John E. Anderson.

On June 13, 1926, tree sparrows were flushed from their nests twice, in the tundra at Dry Creek. In each instance there were two recently hatched birds in the nest. These nests were deep pockets sunk in the moss. The

depth of each exceeded the diameter, and white feathers were used to line them.

On July 7, at Savage River, numerous tree sparrows just out of the nests were observed. In 28 days spent in intensive field work between May 20 and July 25, 1926, 572 tree sparrows were counted. The daily extremes range from 6 to 50, and the average number of tree sparrows seen daily was 20. In 1932, 68 days spent afield in this same territory, between May 16 and August 31, revealed a total of 152 tree sparrows, the daily extremes being 1 and 6 with a daily average of about 2. The 1932 population, according to these observations, was only about one-tenth of that of 1926.

GAMBEL'S SPARROW

Zonotrichia leucophrys gambeli [NUTTALL]

GENERAL APPEARANCE.—A sparrow of medium size with distinct broad black and white stripes on the head of the adults. The young birds have brown and ashy head stripes. The back is striped brown and the hind part of the head and the neck are gray. The throat and the belly are white. Length, 6.7 inches.

IDENTIFICATION.—The Gambel's sparrow is similar to the white-crowned sparrow except that the lore, or area between the eye and the bill, is not black. The white line just above the eye extends forward to the very base of the bill.

DISTRIBUTION.—It breeds from northwestern Alaska and northern Mackenzie south to central Montana and west to the coast mountains of southwestern Alaska and southeastern British Columbia. It is a common bird of wide distribution in the McKinley region.

HABITS.—John and Paula Anderson report the earliest spring arrival of this sparrow at Wonder Lake at 11:30 a. m., on May 4, 1929. Sheldon also reports the first spring arrival at Toklat on May 4, 1908.

During the late season of 1932, I found that Gambel's sparrows were present in goodly numbers at park headquarters when I reached there on May 15. At that date, migration was still in full swing and it continued so for several days.

Sheldon (1930, p. 386) reports finding the nest of a Gambel's sparrow on June 11, 1908. It was found on the lower Toklat River and it contained one fresh egg. Twenty-five miles lower down on the Toklat he found another nest with three young and one egg.

On July 2, 1932, near park headquarters I found a nest containing four eggs in which incubation was about one-third completed. This

nest was placed on the ground in a depression under a protecting willow. The nest was composed of weed stems and plant fiber.

Contrasted with the late season of 1932, at Savage River on July 1, 1926, we found bobtailed young Gambel's sparrows just out of the nest. These birds were watched while they were being fed by their parents.

It was my experience both in 1926 and again in 1932 that the Gambel's sparrows breed commonly on the brushy, warmer, lower slopes near the river but that they are relatively scarce in the alder and willow thickets above timber line.

By the first of September, 1932, practically all of the breeding Gambel's and tree sparrows had migrated. In many instances the young birds of the year were the first to leave, but a very few immature birds remained even after the adult birds had left for the south. The first real fall snowstorm seemed to be the signal for their departure.

This species is a regular breeder in the McKinley region. It is almost as numerous as the western tree sparrow.

GOLDEN-CROWNED SPARROW

Zonotrichia coronata [PALLAS]

GENERAL APPEARANCE.—A sparrow slightly larger than Gambel's sparrow but similar to it in general form though duller colored and without the black line behind the eye. The crown patch is bright yellow or gold-colored instead of white. Length, 7 inches.

IDENTIFICATION.—The darker, duller coloration and the yellow instead of white crown patch distinguishes the adult golden-crowned from the Gambel's sparrow in the field.

DISTRIBUTION.—It breeds from Kotzebue Sound to the Shumigan Islands, Alaska Peninsula, and Kodiak Island, and southeast at least to central British Columbia.

HABITS.—Our only record for this species on the north side of the Alaska Range in the McKinley region is based upon Sheldon's record (1930, p. 402) in which he states that this bird was " . . . commonly seen in spring. Arrived, May 26." Although diligently sought for, both in 1926 and 1932, not a single bird of this species could be found by us. No other bird observers in the region, including those who have made observations at Wonder Lake, have seen the species, so we regard it as of rare or irregular occurrence.

EASTERN FOX SPARROW

Passerella iliaca iliaca [MERREM]

GENERAL APPEARANCE.—A large, robust, reddish sparrow with a short stout bill. The upper parts, particularly the rump and the tail, are a rich rusty-red, about the color of the red fox, from which—because of its color—the bird takes its name. The breast and under parts are white, heavily spotted, and streaked with red. Length, 7.2 inches.

IDENTIFICATION.—The rich reddish-brown color and the short stout bill are the two best field characters for this species.

DISTRIBUTION.—It breeds from the tree limit in northwestern Alaska, Mackenzie, Manitoba, northern Ontario, and northern Quebec south to northern Manitoba, Magdalen Islands, and Newfoundland.

HABITS.—The Eastern fox sparrow was found by me in the dense willow thickets near McKinley Park Station on May 16, 1932. In 1908, Sheldon found the fox sparrow to be a common summer resident on the Toklat. The first spring arrival was noted by him on May 4 of that year.

On June 20, 1926, two breeding male fox sparrows were collected at 3,000 feet elevation on Savage River.

This bird is a regular and rather common breeder in the McKinley region.

LINCOLN'S SPARROW

Melospiza lincolni lincolni [AUDUBON]

GENERAL APPEARANCE.—The Lincoln's sparrow is like a small song sparrow but it is darker in color above and has a distinct buff-colored band across the breast. The breast is marked with fine spots and there is no central blend of spots on the breast. Length, 5.75 inches.

IDENTIFICATION.—The bird's small size, short tail, and buff-colored band across the breast, as well as the lack of any central spot on the breast, distinguishes this sparrow from all other sparrows of the region.

DISTRIBUTION.—It breeds from the Kowak and Yukon Valleys, Alaska, east to Manitoba, Quebec, New Brunswick, and northern New York, and south in the mountains to southern California and northern New Mexico.

HABITS.—Thus far all field work has failed to reveal any positive evidence of the Lincoln's sparrow breeding in the McKinley region. However, it is possible that it may breed there.

This species was first detected in the McKinley area by myself. On August 30, 1932, I collected an adult female at Park Headquarters. No birds of this species had been present at this locality earlier in the summer, so the bird was probably a migrant from farther north.

ALASKA LONGSPUR

Calcarius lapponicus alascensis [RIDGWAY]

GENERAL APPEARANCE.—A sparrowlike bird of medium size with a long claw on the hind toe. The male is characterized by its black crown, throat, and markings on the side of the head. The bird has a rich rusty-red patch on the hind part of the neck. The under parts are white with black stripes along the sides and flanks. The back is streaked with brown. In general the color pattern of the females is similar to that of the males but the colors appear softer and much faded. Length, 6.2 inches.

IDENTIFICATION.—The long hind claw and the white under parts, as well as the distinctly streaked sides and flanks, are the best field characters for this species. No other Alaskan bird has the black facial markings and red hind neck markings of the male longspur.

DISTRIBUTION.—It breeds in northern Alaska, from the Pribilof, Aleutian, and Shumigan Islands, east to the mouth of the Mackenzie River. It is found commonly above timber line in the McKinley region.

HABITS.—The Alaska longspur is the typical passerine bird of the open Arctic tundra. Sheldon noted the earliest spring arrival of this bird on May 12, 1908. On June 16, 1926, on the divide between the Savage and Sanctuary Rivers, we found Alaska longspurs nesting on the barren open tundra at 3,400 feet altitude. Four adult males were noted in full song. In each instance the singer was perched on a stone or tundra tussock. A female was observed carrying craneflies and other insects to her young. She was assisted in the feeding of her offspring by the male bird which also was seen to carry insects in his bill to the young. When we visited this spot again on July 7, 1926, we found the longspurs, both adults and young, feeding quietly and keeping out of sight.

On July 10, 1926, we found longspurs common in Polychrome Pass. The day following they were seen high up on the sides of Copper Mountain.

In 1932 I found longspurs to be about as abundant as they had been in 1926. However, the late wet spring made nesting difficult for all the birds that built their nests out in the open on the ground.

I found these birds to be numerous near the summit of Mount Margaret on June 22, 1932. However, due to the unfavorable conditions, relatively few young longspurs were found in 1932.

EASTERN SNOW BUNTING

Plectrophenax nivalis nivalis [LINNAEUS]

GENERAL APPEARANCE.—A large, white, sparrowlike bird. The male has

conspicuous black and white plumage. In the breeding season the wing and tail feathers are black contrasting with the white body feathers. Length, 6.88 inches.

IDENTIFICATION.—The striking black and white color pattern of the snow bunting cannot be confused easily with any other bird in the McKinley region.

DISTRIBUTION.—It breeds from Greenland and northern Alaska south to northern Quebec; also in Scandinavia and in northern Scotland. It is found in the high mountain passes and along the snow-clad Alaska Range in the McKinley region.

HABITS.—Charles Sheldon reports that the earliest migrant arrived at Toklat on April 8, at which time a specimen was collected. In 1926 we encountered snow buntings first on June 12. I found a pair of snow buntings feeding along a snowbank at the margin of a snow-field on the summit of the north range at 5,200 feet altitude. There had been no snow buntings present when I visited this locality on May 27. The birds had evidently arrived since that time.

On June 28, 1926, a pair of breeding snow buntings was collected in a rock slide on the divide at the extreme headwaters of Savage River. The flabby bare skin on the abdomen of the female of this pair showed plainly that she was incubating a set of eggs.

While Charles Sheldon regarded this species merely as a migrant, our observations and the specimens we collected show that although it is not common in the McKinley region, it does breed there.

HYPOTHETICAL SPECIES OF BIRDS

Five species were reported by local residents as having been seen in the park but positive evidence of their occurrence inside the park is lacking. The records cited, however, are for localities just outside the park boundaries, and these species are, therefore, consigned to the hypothetical list.

RED-BREASTED MERGANSER

Mergus serrator [LINNAEUS]

GENERAL APPEARANCE.—A fish-eating duck, commonly known as saw-bill, with a cylindrical, tapering, serrated bill. The hind toe is lobed as in the sea ducks. Length, 22 inches.

IDENTIFICATION.—The red-breasted merganser may be distinguished from the American merganser by its smaller size and by the feathering at the base of the bill, which, in the red-breasted species, extends well forward on the side of the upper mandible beyond the feathering on the lower mandible.

The male red-breasted merganser has a crest and a reddish breast band which are lacking in the male American merganser. Females of the two species are difficult to distinguish except by the feathering at the base of the bill.

DISTRIBUTION.—It breeds throughout northern Canada and Alaska, nesting north as far as the Arctic coast. In the McKinley region, it was observed on the Nenana River near Healy. This was the only time in the two seasons' field work that the species was found by us.

NORTHERN SHARP-TAILED GROUSE

Pedioecetes phasianellus phasianellus [LINNAEUS]

GENERAL APPEARANCE.—A large pale grouse with many sharp, dark V-shaped marks on the breast and flanks. The tail is soft and pointed, and is almost white. The bird has no characteristic neck adornments or plumes. Length, 17.5 inches.

IDENTIFICATION.—The sharp tail, the light color below, and the many dark V-shaped marks on the breast and flanks distinguish this species from other members of the grouse family.

DISTRIBUTION.—It ranges across the north woods from Quebec to Alaska and it is said to occur along the Sanctuary and Nenana Rivers, near the north boundary of Mount McKinley National Park.

HABITS.—This is a bird of the lower lands in the Tanana Valley, and while we did not actually see any birds of the species within the park, they might easily occur there. Edward Gern, and other men who are familiar with this grouse, state that they have seen "pintail grouse" near the north boundary of the park. We examined study skins which, together with the reports from reliable men, indicate that this species of grouse occurs sparingly over all of the lower Tanana and Nenana River valleys.

On August 1, 1932, I received a northern sharp-tailed grouse that had just been killed, near Sperry, by flying into a speeding gas car on the Alaska Railroad. This bird was sent to me by Colonel Ohlson, of the Alaska Railroad; it was saved as a specimen.

BLACK-BELLIED PLOVER

Squatarola squatarola [LINNAEUS]

GENERAL APPEARANCE.—A good-sized chunky shore bird with a short black bill less than the length of the head. It is checked black and white above and its face, throat, and breast are solid black. The hind toe is rudimentary. Length, 11 inches.

IDENTIFICATION.—Though larger than the golden plover, the black-bellied plover is similar to it. In summer it is more white than black above, particularly on the crown which is nearly white instead of black, as it is in the golden plover. The black-bellied plover lacks the golden flecking or spotting which is present on the backs of breeding golden plovers. Also, the under tail coverts are white in the black-bellied plover and black in the golden plover.

DISTRIBUTION.—It is a circumpolar form, breeding in North America along the Arctic coast west of Hudson Bay.

HABITS.—Our sole record for this species in the McKinley region is based upon the observations of Charles Sheldon (1930, p. 10) who on July 25, 1926, records that "black-bellied plovers were often seen" on the ridges between the Muldrow and Muddy forks of the McKinley River. All the breeding specimens that we collected in the McKinley region have proved to be Pacific golden plovers.

NORTHERN CLIFF SWALLOW

Petrochelidon albifrons albifrons [RAFINESQUE]

GENERAL APPEARANCE.—A medium-sized swallow. It is steel blue above, except for the rump which is a light tan. The tail is not forked. This bird has a creamy bar across its forehead; the face and throat are a rich chestnut, and the belly is white. Length, 6 inches.

IDENTIFICATION.—Good field characters of this species are the white forehead; the square tail which is conspicuous in flight, and the birds' gourd-shaped mud nests plastered on the cliffs.

DISTRIBUTION.—It breeds from central Alaska and upper Yukon south over nearly all of the United States, except Florida and the Rio Grande Valley. In Mount McKinley National Park it is found breeding on Toklat River near the north boundary of the park.

HABITS.—The characteristic gourd-shaped mud nest of this species cannot be confused with that of any other bird. Charles Sheldon (1930, p. 386) states that on June 11, 1908, a colony of cliff swallows had finished their nests on the cliffs at the lower forks of the Toklat and were already laying their eggs.

This species is believed to be a regular summer resident along the lower northern boundary of Mount McKinley National Park.

DIPPER

Cinclus mexicanus unicolor [BONAPARTE]

GENERAL APPEARANCE.—A plump, short-tailed bird. It is uniform dark

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slaty gray in color. Its close and compact feathering permits this bird to dive under water and to even walk under water on the bottom of mountain streams searching for insect food. Length, 6.5 inches.

IDENTIFICATION.—Good field characters of the dipper, or water ouzel, are the chunky body and dark slate gray color; its habit of bobbing up and down, and its loud, sparkling song.

DISTRIBUTION.—It breeds along mountain streams from northwestern Alaska to southern California and southern New Mexico. It was noted on the Toklat River in the McKinley region by Sheldon.

HABITS.—The dipper is noted for its cheerful, bubbling song which may be heard even in mid-winter when practically all other birds have ceased singing. On January 28, 1908, Charles Sheldon (1930, p. 282) states: "But what surprised me most in this region of winter cold was . . . the beautiful song of a small bird, seemingly a symbol of spring . . . I determined to find the songster that was pouring forth such music among ice and snow. As I advanced to the river bank, the music seemed to issue from directly beneath me in the ice gorge, through which the waters swiftly flowed. Cautiously stepping to the edge, I spied a water ouzel sitting on a projection of ice close to the water. Others were in the frosted willows nearby, and still others on and about the ice."

Sheldon states that winter temperatures sometimes drop to 60° below zero in this region. For that particular winter the lowest temperature which he recorded was 41° below zero. Even this seems pretty severe weather for a dipper.

The dipper is not numerous or common in the McKinley region, but it can sometimes be found along the clear creeks and grayling streams in that region.

MAMMALS

CHECK LIST OF THE MAMMALS

1. *Sorex personatus personatus* I. Goeffroy. Masked shrew.
2. *Sorex tundrensis* Merriam. Tundra shrew.
3. *Sorex obscurus obscurus* Merriam. Dusky shrew.
4. *Microsorex hoyi eximius* (Osgood). Cook Inlet pigmy shrew.
5. *Euarctos americanus americanus* (Pallas). American black bear.
6. *Ursus kluane kluane* Merriam. Kluane grizzly bear.
7. *Ursus toklat* Merriam. Toklat grizzly bear.
8. *Martes americana actuosa* (Osgood). Alaska marten.
9. *Mustela arctica arctica* (Merriam). Arctic weasel.
10. *Mustela vison ingens* (Osgood). Alaska mink.
11. *Gulo hylaeus* Elliot. Mount McKinley wolverine.
12. *Lutra canadensis canadensis* (Schreber). Canada otter.
13. *Vulpes kenaiensis* Merriam. Kenai red fox.
14. *Canis latrans* Say. Northern coyote.
15. *Canis pambasileus* Elliot. Mount McKinley timber wolf.
16. *Lynx canadensis canadensis* Kerr. Canada lynx.
17. *Marmota caligata caligata* (Eschscholtz). Northern hoary marmot.
18. *Citellus plesius ablusus* Osgood. Nushagak ground squirrel.
19. *Sciurus hudsonicus hudsonicus* (Erxleben). Northern red squirrel.
20. *Castor canadensis canadensis* Kuhl. Canadian beaver.
21. *Peromyscus maniculatus borealis* (Mearns). Boreal white-footed mouse.
22. *Lemmus yukonensis* Merriam. Yukon lemming.
23. *Evotomys dawsoni dawsoni* Merriam. Dawson red-backed mouse.
24. *Microtus drummondi* (Audubon and Bachman). Drummond meadow mouse.
25. *Microtus operarius endoecus* Osgood. Interior meadow mouse.
26. *Microtus miurus oreas* Osgood. Toklat River vole.
27. *Microtus xanthognathus* (Leach). Yellow-cheeked meadow mouse.
28. *Ondatra zibethica spatulata* (Osgood). Northwestern muskrat.
29. *Erethizon epixanthum myops* Merriam. Alaska porcupine.
30. *Ochotona collaris* (Nelson). Collared pika.
31. *Lepus americanus macfarlani* Merriam. Mackenzie varying hare.
32. *Alces gigas* Miller. Alaska moose.
33. *Rangifer arcticus stonei* Allen. Stone's caribou.
34. *Ovis dalli dalli* (Nelson). Dall sheep.

DESCRIPTIONS OF MAMMAL SPECIES

MASKED SHREW

Sorex personatus personatus [I. GOEFFROY]

GENERAL APPEARANCE.—A very small, active mammal with a sharp pointed nose and small beady eyes. The ears are nearly hidden in the brownish fur of the animal. The tail is well covered with hairs, yellowish white beneath and brown above; the feet are small and delicate. Total length, 4 inches; tail, 1.6 inches; hind foot, 0.5 inch.

IDENTIFICATION.—In contrast to the rather uniform coloration of the dusky shrew, the back of the masked shrew is sepia brown sprinkled with lighter and darker hairs giving the appearance of the animal a "salt and pepper" effect.

DISTRIBUTION.—It is found in the Boreal and Transition Zones of North America from New England to Alaska. On October 8, 1907, shrews were abundant in Sheldon's winter cabin on the main Toklat River.

We found the shrews to be scarce in 1926, and in 1932 I found them to be scarcer still. Some years they are abundant but at other times they are not at all plentiful.

HABITS.—According to Sheldon (1930, p. 169), the shrews were especially cannibalistic, eating mice or shrews that had been caught in the traps each night.

TUNDRA SHREW

Sorex tundrensis [MERRIAM]

GENERAL APPEARANCE.—The tundra shrew is similar to the masked shrew but the tail is shorter. This shrew is large in size. Total length, 4.3 inches; tail, 1.3 inches; hind foot, 0.5 inch.

IDENTIFICATION.—In many instances cranial characters are those relied upon by the specialist to separate different geographic forms or species of shrews. Such characters are not available to the field student; therefore, specimens must be examined in detail later in the laboratory. This shrew is larger in size as compared with other shrews in the McKinley region.

DISTRIBUTION.—It is found in the tundra belt in the region above and east of Norton Sound, Alaska. Sheldon reports this species taken along with other shrews in the Toklat region. We did not encounter it either in 1926 or in 1932 and are inclined to believe that it is rare in McKinley Park.

HABITS.—So far as is known, the habits of this species in McKinley Park are similar to those of *personatus*.

DUSKY SHREW

Sorex obscurus obscurus [MERRIAM]

GENERAL APPEARANCE.—The upper surface of the animal is rich brown. The under parts are ashy. The tail is bicolored, that is, whitish below and brown like the back above. It is large in size and the tail is relatively long. Total length, 4.4 inches; tail, 1.8 inches; hind foot, 0.5 inch.

IDENTIFICATION.—In McKinley Park this species may be distinguished from *personatus* by the uniform color of the upper parts and by the slightly longer tail.

DISTRIBUTION.—It is found in the Boreal Zone of the higher mountain ranges of western North America from Mount Whitney, in California, to Mount McKinley, in Alaska.

In an old cabin at Copper Mountain on July 12, 1926, I found the dried-up remains of a dusky shrew in an old dishpan. It was evident that the animal had fallen into the pan from which it had been unable to escape. This specimen was sent to Washington and through the kindness of Dr. Hartley H. T. Jackson of the United States Biological Survey it was identified by him.

HABITS.—Mr. and Mrs. John E. Anderson reported the capture of this shrew in their garden at Wonder Lake.

It is probably the commonest species of shrew in the park.

COOK INLET PIGMY SHREW

Microsorex hoyi eximius [OSGOOD]

GENERAL APPEARANCE.—It is the smallest of the shrews. In color it is dark brown above and buffy or ashy on the throat, breast, and belly. The tail is bicolored. The sexes are alike in color and size. Total length, 3.3 inches; tail, 1.3 inches; hind foot, 0.4 inch.

IDENTIFICATION.—The small size of this shrew will identify it among the adults of other species found in the region.

DISTRIBUTION.—*Microsorex* is found chiefly in eastern North America but this geographic race is found on the Kenai Peninsula and in the Mount McKinley region. Charles Sheldon collected specimens on the upper Toklat River along the base of the Alaska Range in 1906–8. We searched for this shrew, but did not find it either in 1926 or in 1932, and we consider it a rare species in Mount McKinley National Park.

HABITS.—Little is known of the habits of this species other than that which applies to shrews in general in the park.

AMERICAN BLACK BEAR

Euarctos americanus americanus [PALLAS]

GENERAL APPEARANCE.—The robust form, the short stout legs, the plantigrade feet and the large humanlike tracks that the black bear leaves—these characters are known to nearly every national parks' visitor. In the western part of the United States the brown or cinnamon phase of this animal is about as numerous as the regulation black phase, but in the McKinley region all the black bears are believed to be black. The weight varies greatly according to the season and the food supply. An average adult male weighs from 250 to 350 pounds. Male bears are considerably larger than the females, but it is rare under natural conditions in the wilds, without regard for the overfed park or "zoo" specimens, for black bears to weigh as much as 500 pounds. Size, large; total length, 5–6 feet; tail, 3–4 inches; hind foot, 7–10 inches.

IDENTIFICATION.—*Euarctos americanus americanus* is so well known that further description is not required.

DISTRIBUTION.—Black bears were originally found throughout the wooded or timbered sections of North America. In the McKinley region they are found along the larger streams and in the lower country just north of the park. Now and then a black bear strays into the lower wooded areas of the park but the range of this species lies below that of the grizzly.

Grizzly bears cannot climb trees; black bears can if they are not too fat. It is believed that this ability or lack of ability to climb trees is an important factor in the distribution of these two animals in the McKinley region.

HABITS.—The black bear is notoriously fond of berries. On August 8, 1932, I found unmistakable bear droppings near a wooded section not far from Wonder Lake where blueberries grew abundantly. Farther along the trail, claw marks on spruce trees proved that it was a black bear.

The meat of a young berry-fed bear is excellent. We enjoyed a black bear roast which was provided by Fannie Quigley from an area just outside the park in the Kantishna region.

Black bears consitute not more than about 1 percent of the bear population in Mount McKinley National Park.

KLUANE GRIZZLY BEAR *Ursus kluane kluane* [MERRIAM]

TOKLAT GRIZZLY BEAR *Ursus toklat* [MERRIAM]

GENERAL APPEARANCE.—These two grizzlies are the largest carnivorous mammals found in the Mount McKinley National Park.[1] The outstanding

[1] The writer observed for several hours and photographed what he feels certain was a tundra brown bear, at Igloo Creek, June 9, 1932 (Fig. 44). The writer has had field experience with the tundra brown bear just outside of Mount McKinley National Park and believes that, eventually, its existence within the park will be proved.

characters of these two grizzly bears, which are so similar in general appearance that it is very doubtful if even an expert could tell living specimens apart in the field, are the robust frame, massive legs, and the hump over the shoulders; the long silver-tipped over-hairs of the animal's coat, and the long, smooth, light-colored, slightly curved claws.

There has been so much discussion regarding the size of the Alaskan bears that actual measurements are given herewith of Toklat grizzly bears which were killed and measured by the late Charles Sheldon who spent two seasons hunting in the Mount McKinley region before it was set aside as a national park. The first of these was an old female bear killed at the forks of the Toklat on May 28, 1908. This bear was carefully measured twice on level ground by Sheldon (1930, p. 376). The results were as follows: Length, 5 feet 4 inches; tail, 5¼ inches additional; height, 37 inches; hind foot with claws, 10¼ inches. On May 12, 1908, Sheldon shot a male grizzly which he states was the largest bear that he ever killed in the interior of Alaska (1930, p. 351). On rough ground this bear measured as follows: Length, 5 feet 9½ inches; tail, 5 inches; sole of hind foot with claws, 12 inches.

Regarding the size of grizzly tracks Sheldon states (1930, p. 365): "I made it a practice to measure carefully and repeatedly the tracks of bears but only on hard surfaces where the impressions were clearly defined. . . . The hind foot of the largest measured 10½ inches, the claw punctures extending an inch beyond; the width of the paw, 6 inches."

IDENTIFICATION.—The large size, the hump over the shoulders, the "dished" face, light color, and long, nearly straight claws are all field characters that may be used to distinguish grizzlies from black bears when the living animals are encountered.

Skulls of grizzlies may be distinguished from those of black bears by their larger size and by the size of the back upper molar tooth. After examining several hundred bear skulls in the University of California Museum of Vertebrate Zoology and in the United States National Museum I have yet to find an adult grizzly skull in which this back upper molar tooth measured less than 1¼ inches in length. None of the black bear skulls which I examined had a back upper molar that exceeded this measurement.

DISTRIBUTION.—The habitat of the Toklat grizzly, according to Merriam (N. A. Fauna, 1918, no. 41, p. 95) is "restricted to Alaska Range." The habitat of the Kluane grizzly is given by the same authority as "Southwest corner of Yukon Territory east of the St. Elias Range, extending northwesterly in Alaska to Mount McKinley region (head of Toklat)" . . . Charles Sheldon killed a bear of this species at the head of Toklat River.

Grizzly bears are found throughout the park on the north side of the main Alaskan Range but I found that in summer they were most numerous above timber line in the higher passes: at the head of Savage River, Cathedral Mountain, Sable Pass, and on the headwaters of the East Fork of the Toklat River.

In the park area during the summer grizzly bears have been most frequently found where the ground squirrels were numerous.

HABITS.—Commenting on the color of the Toklat grizzly bears killed by Sheldon, Osgood (1907, p. 63) says, "They show much variation in color, especially one litter of cubs, one of which is very pale, and another very dark, and the third almost exactly intermediate." Sheldon (1930, p. 72), in commenting on color says that in a litter of three cubs, one male "was pale buff like the mother. A second male was silver-tipped brown; the third, a female, was exactly intermediate in color." Again Sheldon (1930, p. 339), referring to a mother and cub, says: "The pelage of both was long and full, in perfect condition, the color light buffy on the head and body, dark brown on the belly, legs, and tail." Sheldon also states (1930, p. 378): "It seemed clear that while bears vary much in color when they hibernate in the fall, they all emerge from the winter dens in coats of uniform color." My observations do not agree with this statement.

There is a much greater amount of summer bleaching of pelage in the grizzly bears of the McKinley region than there is in the grizzly bears of the Yellowstone where the total number of hours of sunlight in summer is less. It is also true that certain old grizzly bears in the McKinley region are a light cream color when they emerge from their winter dens while other adults are dark-colored (brown) when they emerge and they remain dark-colored throughout the summer. As an example, on May 29, 1932, near park headquarters, a female bear that was not many days out of her winter den was observed by me at close range. She was very light-colored. In fact, she was as light-colored as any of the 26 grizzly bears that I saw and photographed in 1 day—September 1929—in Yellowstone National Park. Again on June 12, 1932, at Double Mountain in Mount McKinley Park I found a large old male grizzly that was cream-colored. However, contrasted with this, on July 14, 1932, on the Teklanika River near Sheldon's 1906 camp I watched an old mother grizzly with three dark cubs. They were all dark brown, almost black. This mother bear was seen at intervals all summer both by the road crew working at Sable Pass and by me. She remained dark-colored throughout the summer.

In our experience the color of the McKinley Park grizzly varies greatly with individuals; the young animals are darker than the old ones; certain

individuals are buffy or cream-colored when they come out of their winter dens, while other individuals of this species are dark-colored when they emerge and they remain dark-colored all summer until and after the annual fall molt.

When the grizzlies first emerge from hibernation, the mountains and foothills are still heavily mantled with snow (fig. 40). However, instead of going down to the lowland which by then is free from snow the bears strike out for the still snow-clad foothills—particularly for the rougher foothills where the Alaska mountain sheep spend the winter. Although it would seem as if they were going away from an available food supply, rather than toward it, they appear to know where to look for the frozen carcasses of mountain sheep that have been killed by avalanches or that have died during the winter through accident or disease.

Grizzly bears because of their great weight leave deep tracks (fig. 41) that form broad trails through the snow. Aided by their strength and strong claws these bears cross steep, dangerous snowslides that would stop a man. On June 10, 1932, I watched two grizzlies near Sable Pass go up a steep snowbank with the greatest ease (fig. 42). When first discovered these two bears were feeding on the remains of a winter-killed Alaska mountain sheep. I found grizzlies eating both dead caribou and mountain sheep, but a careful examination showed that the carcasses were of old, winter-killed animals. It is entirely likely that at times grizzlies do kill young caribou, but although we have watched them with binoculars, and followed them about for many hours, we have never yet seen grizzlies make any attempt to capture or to kill either a caribou or a mountain sheep. The inexperienced person discovering a grizzly eating a caribou or mountain sheep would be likely to jump at the conclusion that the animal being eaten had been killed by the bear which in many known cases is not the fact.

When hunting for dead sheep and caribou, a grizzly depends upon its acute sense of smell rather than upon its eyesight which is rather poor. Sheldon (1930, p. 66) observed a grizzly that located a ram which he had shot. He describes her actions as follows: "She kept throwing up her nose to sniff the air, and finally seemed to catch a scent, for she started walking rapidly across the rocky slope, her head held high, continually sniffing, guiding her course by scent directly toward the canyon where I had killed the * * * rams." Reaching the dead sheep, "She began to paw out the rocks near the carcass, scooping out a deep hollow, tumbling big rocks down the canyon and moving others to one side, apparently with no effort at all. Then, seizing the carcass with her jaws, she dragged it into the hollow and pawed the rocks all around it, completely covering

Figure 40.—THE RANGE OF THE GRIZZLIES IS STILL COVERED WITH SNOW FOR SEVERAL WEEKS AFTER THE BEARS COME OUT OF HIBERNATION IN THE SPRING.
Photograph taken May 29, 1932, head of Jenny Creek. *W. L. D. No. 2773*

it, so that nothing but a mound of broken rock was visible." One of the cubs of this bear scratched the rocks aside and started to eat the sheep, but the mother bear pawed the rocks into place again. Then she went over the edge of the canyon only to return to its edge 14 times in less than half an hour to gaze below, apparently to assure herself that her stored food supply was undisturbed.

I had a similar experience to Sheldon's with two grizzly bears in the same region in 1932. On the night of June 13, two grizzlies raided the meat-house of the East Fork road camp and carried off a quarter of beef. This was the first time that grizzlies had raided any road camp in McKinley Park. People were in camp at the time. The cook was asleep in a tent beside the meat-house—previously he had driven these same bears away by a vigorous barrage of empty tin cans. The two bears having stolen the quarter of beef ate a portion of it and, by the time I arrived, had dug a hole and buried the remaining portion on a snow-covered ridge a short distance away. One of the bears went off to sleep, while the other re-

Figure 41.—TRACKS OF A GRIZZLY LEADING ACROSS A SNOWFIELD.
Photograph taken June 8, 1932, Sable Pass. W. L. D. No. 2978.

mained near the cached meat (fig. 43). By detouring around to one side and vigorously rattling a small tin can filled with rocks I was able to waken and drive away the sleeping grizzly. Upon seeing his partner leaving, the other grizzly also left. I drove the two bears a mile away from the camp but they were both back again just 2 minutes after I returned.

In our experience, grizzly bears appear to have a highly developed sense of property rights. Woe unto any animal that is caught robbing or disturbing a grizzly's cache! Black bears having been caught robbing a grizzly's store of food have been torn into small pieces. A sure way of getting into trouble is for anyone to try to drive a grizzly away from his kill. It is our opinion that many of the so-called unprovoked attacks by grizzlies have taken place because the bear feared that he was going to be robbed.

Mice are caught in considerable numbers by grizzlies. Sheldon reports (1930, p. 170) that on October 9, 1907, after a recent snowfall, mice—which at that time were exceedingly abundant—had made tunnels under the snow. Evidently scenting a mouse in a tunnel the bear would plunge its nose into the snow, often ploughing through as much as 10 feet, until the

mouse ran down its hole. Then the bear would dig it out and catch it with its paw. Grizzlies often turn over large flat rocks to capture mice and insects living under them. Marmots that have been unwise enough to make their burrows outside of the protection of boulders are at times dug out and captured by grizzlies.

However, the real staff of life of the grizzly is the ground squirrel. During the long summer days the grizzlies spend many hours in digging out these nutritious rodents. Most of the digging for squirrels takes place on the higher ridges above timber line where, because of the ground being frozen below the surface, the squirrel burrows are relatively shallow and hence easily dug out. In two instances when grizzlies were watched hunting squirrels, the squirrels were dug out in 20 and 30 minutes respectively. Sheldon (1930, p. 63) reports this operation as follows: "I watched the bear, which was sitting on its hind quarters actively at work, throwing out the dirt vigorously in all directions." This bear dug with either front paw, "with mouth open and tongue hanging out, it panted like a good-natured dog."

Figure 42.—A GRIZZLY CLIMBING A STEEP SNOW BANK.
Photograph taken June 9, 1932, Igloo Creek. W. L. D. No. 2637.

On July 2, 1926, at Sable Pass I watched a very large female bear and her two cubs for several hours. They were feeding along the hillside, traveling high above timber line and keeping to the upper edge of the green meadows which lay just below the jutting cliffs. The mother bear, which was of a rich brownish color, walked along sedately as though she had never had a care in the world; the cubs trailed in her wake at random. They spent a great deal of time and energy chasing each other back and forth, and up and down the hillside. These two cubs stood about 16 or 18 inches high at the shoulders and were much darker in color than their mother. At a distance they appeared to be almost black. However, with the binoculars we could see a brownish streak along the center of the back and across the shoulders. While we continued to watch with the binoculars, the two cubs stopped chasing each other and began to roll over and over sideways, just like a barrel. They rolled down the smooth, steep, grassy slope clear to the bottom, a distance of 200 feet. Their aim seemed to be to determine which one could roll the farthest. Upon reaching the bottom of the slope they

Figure 43.—THE DARK GRIZZLY REMAINED NEAR HIS MEAT CACHE WHILE HIS MATE SLEPT NEARBY. FRESHLY FALLEN SNOW WAS 4 INCHES DEEP.
Photograph taken June 14, 1932, East Fork. *W. L. D. No. 2642.*

turned around and raced back up the hill, apparently to see which one could reach the mother bear first.

While the cubs were thus playing and working off their surplus energy the mother bear traveled slowly along the hillside stopping at intervals to sniff at the entrances of numerous ground-squirrel burrows. Ordinarily one sniff was all that she took. It seemed to be sufficient to inform her whether or not the animal was in its burrow. At last she found a squirrel in his den. This den was located on a steep hillside at the base of an outcropping of shale rock. The old bear dug a little at the entrance of the ground-squirrel's burrow. Then she stopped and went around looking carefully for other burrows or back door entrances through which the squirrel might escape, and locating two such burrows she dug into them a little way finally plugging them up with earth. She then returned to the main entrance of the burrow and resumed her digging there. By this time the two cubs, realizing that lunch was in preparation, stopped their romping and came over to assist their mother. It was evidently an old game to them. One cub posted himself at the top of a rock pile to watch operations. The other cub helped by taking turns with the digging. The little bear could get into a much smaller hole than the mother was able to manage. Finding that a large slab of rock which barred the way was firmly embedded in solid rock, the mother bear stood up on her hind legs and took hold of it with her front paws. She pulled backward and pushed on it lustily several times until she finally broke it. Then she threw the dislodged portion of it down the hill. After that she resumed her digging; the cubs looked on expectantly. At length she paused and reaching into the hole as far as she could she took the squirrel out in her mouth and carried it over to a patch of short green grass. There she gave the squirrel two or three savage bites and while we waited in eager expectation for her to divide it between the cubs, she suddenly swallowed it whole. The two cubs were obviously disappointed. Then the three bears went across to a rock slide, the mother bear leading and the two cubs tagging along behind her. From the rock slide they went on to another green meadow where they stopped and ate green vegetation. Finally they all went around the shoulder of the mountain and I lost sight of them. The average distance traveled by this family of bears while foraging was about 1 mile per hour.

On June 9, 1932, at Igloo Creek, I spent an entire morning watching and photographing a bear at a distance of 30 to 40 feet (fig. 44). This bear was industriously digging up and eating the succulent roots of the *Anemone parviflora* (fig. 45) which were growing in scattered clumps in the sandy soil along the stream that ran through an open spruce forest. When I first

Figure 44.—A LARGE GRIZZLY OR POSSIBLY TUNDRA BROWN BEAR PHOTOGRAPHED AT A DISTANCE OF 40 FEET WHILE THE ANIMAL WAS DIGGING AND EATING "ANEMONE" ROOTS. THE PHOTOGRAPHER WAS IN PLAIN SIGHT AND MADE NO ATTEMPT TO CONCEAL HIMSELF. *Photograph taken June 9, 1932, Igloo Creek.* *W. L. D. No. 2408.*

approached the bear in an opening it ceased feeding and withdrew to the deeper woods. But when I stood motionless in the open, it soon returned and began to claw out more of the *Anemone* roots, using first the right and then the left front paw, alternately. At times this bear used its nose to root out the plants after the sandy soil had been well clawed up. It seemed probable that its sense of smell had led it to the choice bits that would otherwise have been lost.

When I approached to within 25 feet of the bear, the animal ceased feeding and gave a warning cough or grunt. Once it made a pretense as if it were going to rush in my direction. I interpreted this behavior of the bear as its way of warning me to keep at a safe distance and I took the hint. As soon as I withdrew a few feet the bear resumed its feeding. It continued to feed all morning. The large bulk of the bear and the small size of the roots and stems that formed its food quota made hours of food gathering necessary each day.

Sheldon examined the stomach contents of grizzly bears that he had killed

Figure 45.—THE SUCCULENT ROOTS OF THE WIND FLOWER (ANEMONE PARVIFLORA), THE FIRST FLOWER OF SPRING, ARE DUG UP AND EATEN BY GRIZZLIES IN EARLY SPRING.
Photograph taken June 13, 1926, Savage River. *M. V. Z. No. 4989.*

in the Mount McKinley region. The following table gives in a condensed form the results of his examinations.

Stomach contents of Toklat grizzly bears examined by Charles Sheldon

Locality	Sex	Date	Stomach contents
Toklat	Female	May 5, 1908	Roots of pea vine, also a few mice.
Do	Male	May 12, 1908	Roots of pea vine, also one ground squirrel.
West branch Toklat	Female	May 14, 1908	Roots of pea vine, also two mice.
Teklanika	do	Aug. 22, 1906	Ground squirrels and round worms.
Do	do	Aug. 24, 1906	Meat and a few pieces of grass—no sign of blueberries, which were abundant in that vicinity.

As previously stated, although I followed grizzlies about for hours where Alaska mountain sheep were numerous, I have never seen the bears make

any attempt to capture the sheep. Sheldon had a similar opportunity to make these same deductions on September 1, 1906, on the Toklat. He watched a grizzly approach and pass within 75 feet of five rams that were feeding in the open. The sheep did not run away and the bear gave them hardly more than a passing glance.

While black bears are notoriously fond of berries the grizzly does not appear to eat them to any great extent. In 1932, I found excellent blueberries growing abundantly in the region. However, only a very small proportion of the bear droppings which I examined showed that berries had been eaten. Sheldon (1930, p. 117) in commenting on this states, "It is perfectly clear that many of the bears of this region do not go for the salmon that ascend the rivers, nor do they feed much, if at all, on berries."

Grizzly bears have playful moods. On June 8, 1932, after the family laundry had been done and hung up to dry, my wife and I went up to Sable Pass to look for a pair of young grizzlies that had been seen there. Our quest was unsuccessful, but upon returning to camp at 8:30 p. m. that evening we found all of our recently washed clothes torn off the line. A hasty glance around revealed the grizzly (fig. 46) which, having finished the clothes, was calmly waiting further adventure.

At another time two cubs were watched as they rolled over and over down a steep, grassy slope. The game appeared to be to see which could roll the farthest. Grown grizzlies are fond of sleeping on or sliding down steep snowslides. Twice I found grizzly bears asleep in the snow after having eaten heavily. The first instance was on June 9 at Igloo Creek. The bears were on a snowbank high up on a mountain side. After sleeping curled up in the snow for half an hour the two bears began to play. They seemed to be vying with each other to see which one could toboggan the farthest down the snowslide on its stomach with its front and hind legs extended.

On June 12, 1932, at 9 o'clock in the morning I stalked a large cream-colored grizzly that had gone fast asleep in the sun on a steep but sheltered mountain side near Double Mountain. He was curled up on his side like a house cat and because of a favorable wind I was able to crawl down to within a few yards of him. I got so close to him that I could have tossed a pebble and hit the animal. However, not knowing whether *Ursus* had a cache nearby nor just how the bear might take a sudden awakening, I decided it was best to let a "sleeping dog lie." So I crawled back and left the grizzly to sleep in peace.

There is always a possibility of danger if one comes suddenly upon a mother bear with small cubs, or if one inadvertently tries to drive a grizzly

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away from its cached food. However, I tramped for days through portions of the park where the grizzly bears were most numerous and while I always kept a good lookout ahead for bears, I gave them a wide berth and I never had any real trouble with them—although I have given them considerable provocation by following them and photographing them. However, it is not safe to follow all grizzly bears, and the park visitor is strongly advised not to approach any of them closely or to molest them in any way.

Sheldon says, regarding grizzly bears (1930, p. 375), "When one gets close to a bear and realizes its activity and power, it is difficult to restrain the feeling of danger" and he also says (1930, p. 63), "The stalking of no other animal on the American continent is so exciting as the close approach to a grizzly bear. Its activity is astonishing; it is constantly on the move, and may suddenly turn and go in any direction. And when very close, one's nerves are at high tension, for in any small depression the hunter eagerly watching may suddenly meet the bear face to face."

Figure 46.—WHILE WE WERE ABSENT THIS GRIZZLY CAME INTO CAMP AND BROKE INTO OUR CABIN. *Photograph taken June 8, 1932, Igloo Creek. W. L. D. No. 2634.*

ALASKA MARTEN

Martes americana actuosa [OSGOOD]

GENERAL APPEARANCE.—A mammal the size of a small house cat. The face is sharp-pointed. The color is golden brown and the animal has a large orange-colored patch on the throat. The feet are dark brown and well furred. The toe pads are small and the claws are sharp and curved. The length of the head and the body is 16 to 20 inches. The tail is bushy and about half the length of the body, being from 7 to 10 inches long. The ears are erect, 1⅛ to 1⅝ inches high.

IDENTIFICATION.—A distinctive badge of the marten is the broad orange-colored throat patch. The mink is the only animal likely to be confused with the marten. The fur of the marten is longer and fluffier than that of the mink. Too, the mink lacks the orange throat patch of the marten.

DISTRIBUTION.—It was formerly common in the heavier spruce timber of the region but it is greatly reduced in numbers now—due to excessive trapping—so that it is very scarce even in the park. Former Chief Ranger Nyberg reports seeing the tracks of only one marten in the park during the winter of 1926. In 1932 I saw a number of marten pelts. These animals had been trapped on Eldorado Creek just outside the park.

HABITS.—The pine marten is often called "American sable. Because" of its rarity, small size, and secluded habits it is not an animal that is frequently seen. Furthermore, it is largely nocturnal and lives to a considerable extent on mice and rabbits. Martens are of an exceedingly nervous temperament and are quick as a flash. Unlike the weasel they rarely kill more than is necessary to supply their immediate needs.

The real home of the marten is in the heavier stands of spruce timber located along the larger streams outside of and below the park for the most part. At present the species is still rare in the park, but there is evidence that it is breeding up and becoming more plentiful in certain timbered sections within the park boundaries.

ARCTIC WEASEL

Mustela arctica arctica [MERRIAM]

GENERAL APPEARANCE.—Weasels have long slender bodies and short legs. The head is small. The ears are short and the tail is round and tipped with black. The black-tipped coloration of the tail is not subject to the seasonal change which is characteristic of the rest of the pelage. The Arctic weasel is brown in summer and, except for the tip of the tail,

like the ptarmigan and varying hare, is pure white in winter. The measurement of the male Arctic weasel is: Length, 16 inches; tail, 3 inches; hind foot, 2 inches.

IDENTIFICATION.—The snaky form, the small size, and the black-tipped tail are outstanding characters of the weasel.

DISTRIBUTION.—Weasels are found over most of North America. The Arctic weasel is found on the tundra and along the Arctic Coast. Their local distribution is governed largely by the presence of mice which comprise the chief food supply of the Arctic weasel.

HABITS.—In Mount McKinley National Park there is a close relationship between the numbers of mice and of weasels. During periods when mice are abundant, weasels as a result of this plentiful food supply breed abundantly. Then when there is a scarcity of food in winter due to the disappearance of the hordes of mice, the weasel population becomes greatly reduced probably because of food shortage leading to starvation and faulty reproduction.

A few weasels, scattered over large areas, manage to live through the lean years when the mice are scarce. In 1932, such a lone weasel made his home at the main warehouse at Park Headquarters. By making inquiry among the rangers the fact was revealed that during the previous fall many mice had been attracted by the hay, grain, and other foodstuffs that were stored in the warehouse. The weasel in turn had been attracted by the mice and had spent the winter in and about the warehouse and other nearby buildings.

This weasel had been specially protected by the park officials because he had been able to keep the mouse population in check about the buildings. On May 19, when I first made the acquaintance of this animal, he was in full brown summer pelage without any trace of the white winter coat. This weasel was not afraid of human beings but had a decided distrust of the camera so that it was not feasible for me to get any photographs of him.

At one time when we had him cornered under a pile of old boards he stuck his head out through a crack and with his mouth open uttered a sharp, high-pitched scream of great penetration.

ALASKA MINK

Mustela vison ingens [OSGOOD]

GENERAL APPEARANCE.—Minks are long-bodied, short-legged aquatic weasels. They are somewhat smaller and more slender than a female domestic cat. The tail is moderately bushy and about half as long as the

body. The general color is a dark glossy brown with occasional small white spots on the throat and under parts. The adult male minks are half again as large as the adult females. Measurements of adult male Alaska minks are as follows: Length, 29 inches; tail, 7.2 inches; hind foot, 3 inches.

IDENTIFICATION.—The Alaska mink is the largest living race or species of mink in America. The size alone is usually diagnostic. They are somewhat lighter in color than the Pacific mink which ranges along the coast of British Columbia, Washington, and Oregon.

DISTRIBUTION.—Minks are found along streams and watercourses over nearly all of North America. The Alaska mink is found over most of the western portion of Alaska. In Mount McKinley National Park they are found chiefly around ponds and along the larger streams.

HABITS.—The only specimens of mink from the McKinley region that we have been able to examine were a pair of fine pelts of this species which John E. Anderson had collected near Wonder Lake in an area which was then just outside the north boundary of the park. This area has been added recently to the park. These pelts showed clearly the large size and characteristic color of the Alaska mink.

In 1932, I found some old mink signs in this same locality; however, at best, mink are rare in the park.

MOUNT McKINLEY WOLVERINE

Gulo hylaeus [ELLIOT]

GENERAL APPEARANCE.—The wolverine is the largest member of the weasel family. It has a sturdy bearlike form with short, powerful legs and a bushy tail about one-fourth as long as the body. The feet are semiplantigrade and are armed with powerful curved claws which are light-colored and semiretractile.

The pelage or coat of the Mount McKinley wolverine is long and coarse with a thick fine under fur. The general color of the animal is dark brown. It has a broad pale yellowish-white stripe that extends from the shoulders along both of its sides; these stripes unite at the base of the tail giving the living animal a peculiar streaked affect. Examination of the pelts of wolverines caught near Mount McKinley Park during the winter of 1931 showed that *hylaeus* is indeed a dark race. This was also true of a living wolverine observed by me at close range on May 21, 1932, in Savage River Canyon.

A large male Mount McKinley wolverine killed by Charles Sheldon near Polychrome Mountain, March 11, 1908 (1930, p. 314), measured:

Length, 43⅝ inches; tail, 8$^{9}/_{16}$ inches; hind foot, 7½ inches; height, 15¾ inches.

IDENTIFICATION.—Upon meeting a wolverine under natural conditions in the wilds I was impressed with the following field characters: The robust bearlike form and dark color of the animal, which suggested a porcupine; the broad whitish-yellow band extending along the sides and meeting over the rump, definitely identifying it as a wolverine; and finally, a trait which showed the animal's direct relationship to the weasel family, its poise in posture as it stood straight up on its broad hind feet so as to get a better view of me.

DISTRIBUTION.—The wolverine is found throughout Alaska and northern Canada. It was formerly found in the northern United States but now has been exterminated over much of its southern range. *Hylaeus* is found only in Alaska in the region of Mount McKinley and is distributed throughout the park.

HABITS.—Many people have written about the strange habits of this animal but probably not one in ten of these writers has ever seen or had the experience of meeting a wolverine in the wilds. They have drawn largely upon the stories told to them by trappers and others. As a result, much legendary information—which has never been verified—has been published about the wolverine. Therefore it is deemed especially important that unbiased observations made by trained men be recorded in detail and be made available to the public.

Charles Sheldon, an accurate observer, has faithfully recorded many personal experiences with wolverines in the Toklet region in 1906–08.

In 1932, I made a special study of the ecology of the wolverine in Mount McKinley National Park and had an unusual encounter with an individual of the species in its native habitat.

The wolverine like the timber wolf is naturally cautious about approaching any strange object and Charles Sheldon (1930, p. 301) states in referring to a female wolverine that he captured alive, "She possessed keen quick sight, and many tests proved that her power of scent was as strong as that of a wolf. She had no fear of dogs. . . . She would carefully avoid any strange object, . . . never approaching it without suspicion and caution, and never touching it." This trait of the animal to avoid strange objects accounts for the difficulty some collectors have had in trapping wolverine. We have known instances where a wolverine becoming familiar with traps and apparently losing all fear of them would spring the traps repeatedly and always manage to escape itself.

Wolverines do carry off, or eat on the spot, the animals which they find

caught in traps and they can eat a prodigious amount of meat or of other food in a relatively short time. Because of this latter fact the animal is merited with the well-earned name of "glutton." Apparently the great amount of food that they can consume at one time is a natural adjustment to conditions regulating the ability to exist in the far north where one day may mean a feast and the next day a famine. In 1913–14, when I spent a winter "frozen in" on the shores of the Polar sea of northern Alaska, I found that the native Eskimos, in 36 hours—comparable to the gluttonous wolverines—could consume large amounts of fresh walrus or seal meat and that they could go foodless then for several days without serious discomfort. Sheldon's female wolverine consumed the entire carcass of a silver fox in one night.

During March 1908, Sheldon (1930, p. 300) noted a trail coming down to the river bar from a point high up in the rocks. It had been made by a wolverine transporting a sheep, apparently large pieces at a time, to a spruce thicket at least a mile and a half from the place where the sheep had died. Sheldon thought the sheep was one which had been wounded here by hunters two days before. Numerous pieces of skin and bones and bits of frozen grass from the paunch of the sheep remained, as well as several large frozen balls of solid meat that had been gnawed into globular form. From the great quantity of excreta the wolverine had continually evacuated, Sheldon believed it must have consumed an incredible amount of meat in a short time. Although wolverines are known to drag their kill for some distance before devouring it, Sheldon states (1930, p. 293) that the malicious destruction of property, such as the carrying off of empty traps, is doubted since reliable proof of such actions has not been forthcoming. He says that these stories are probably products of the imagination.

Repeated observations both by Sheldon and myself indicate that wolverines travel widely yet tend to follow regular routes. This tendency was especially noted by Sheldon on the Toklat in winter. He found trails of four different wolverines in the snow in localities 10 to 15 miles apart. He watched these trails throughout the winter and wolverine tracks of similar size appeared near his winter cabin on the Toklat every "8 or 9 days." From this fact he concluded that wolverines travel periodically over regular routes.

Sheldon reports (1930, p. 294) that a female wolverine when chased by his dogs readily climbed to the very top of a spruce tree. He states, "She climbed so easily . . . that no one seeing her could doubt that wolverines are accustomed to climbing trees." However, of all of the wolverine trails that he followed through the snow this is the only instance of a wolverine

climbing a tree that he records. We have been unable to find evidence that wolverines make a regular practice of climbing trees unless they are hard-pressed.

The wolverine is not generally regarded as an animal of clean individual habits, but Sheldon found that the female which he captured alive was very cleanly, depositing feces in selected places and where possible, covering her dung each time.

As I was climbing up a steep snowslide at 10:20 o'clock on the morning of May 21, 1932, I suddenly came face to face with a large male wolverine which was coming down the slide. The surprised wolverine stood straight up on his broad hind feet. He looked like a huge black weasel as he stood thus poised in order to get a better view of the stranger who barred his trail but 30 feet away. He was accustomed to yielding the right of way only to the big brown and the grizzly bear and he stood his ground uttering a low, throaty, and menacing growl. (The female that Sheldon captured likewise growled when cornered. He stated (1930, p. 292) that she also made a "whistling chatter" upon the close approach of any person.) As I gazed into those unflinching black eyes I was not at all sure whether the wolverine or I would do the running, but I stood the suspense longer than did the wolverine which finally ran past me down the slide. By following the wolverine's back trail I found clear-cut hind foot tracks of the animal which measured 7½ inches in length and 4½ inches in width.

The relation of the wolverine to other animals is varied and interesting Sheldon reports (1930, p. 258) that near the north base of Denali on January 1, 1908, "The fresh track of a wolverine crossed the snowshoe trail and was followed for some distance by that of a fox." I found that during the winter along the extreme northern coast of Alaska each polar bear is not infrequently followed over the ice at a respectful distance by a white fox which lives on the scraps of seal left from the bear's catch. In like manner it is believed that an Alaskan red fox may at times follow the trail of a wolverine in order to gather any small bits of food which may have been left by the wolverine. On another occasion, on January 5, 1908, Sheldon watched a Canada lynx feeding upon the carcass of a mountain sheep. Upon the approach of a wolverine the lynx left the carcass. In his report of the incident Sheldon concluded, " . . . evidently the relation of lynx to wolverine is one of fear."

During his hunting trips in the Mount McKinley region Sheldon found " . . . that the wolverine is completely at home among the crags."

On November 17, 1907, Sheldon followed the tracks of a wolverine but he saw no evidence of mouse or squirrel hunting, for the trail continued with-

out interruption. However, he reports seeing a wolverine on March 2 which appeared to be hunting mice. On March 11, 1908, Sheldon killed a wolverine near Polychrome Mountain and upon examining the stomach contents of the animal he found it to contain: " . . . the feathers of a ptarmigan and the remains, including two tails, of ground squirrels." Sheldon states that he does not believe it possible for the wolverine to dig the squirrels out of the frozen ground and that it is, he believes, more likely that some of the squirrels had been lured out of their winter dens by an early spell of warm weather at which time they were captured by the wolverine.

In certain instances Sheldon found from following wolverine tracks in the snow that the animal had kept under cover when traveling or hunting food. It is believed that this action is for offensive rather than for defensive purposes.

Sheldon (1930, p. 310) reports a band of mountain sheep and at the same time the fresh tracks in the snow of a wolverine. He concluded: "It is not improbable that the animal was following and hunting the sheep."

A study of the carcasses of mountain sheep indicates whether the sheep have died slowly of starvation or disease in winter and have been found and eaten by bears or by other carnivores the following spring or whether the sheep have been killed by wolves or wolverines and eaten while the meat was yet fresh. In the former instances there are no blood stains whereas in the latter evidences of blood, stained pelage can usually be found.

There has been and is strong feeling in the West against the wolverine because of its destructiveness to animal life and to human property. However, it should be remembered that the wolverine is an important member of the native fauna of Mount McKinley National Park and as such is entitled to a continued existence there. It is our belief, based on years of field investigation of the fur-bearers in the West, that the wolverine is in serious danger of extermination. Outside of Alaska, we have recent dependable records of the existence of wolverines in only two or three of our other national parks. Even in these protected areas the status of the wolverine is not believed to be at all secure. We further believe that our national parks are the only areas where these animals can find a permanent and sure sanctuary.

Upon personal investigation, Mount McKinley National Park out of all of our national parks appears to be the only one now which has a good breeding stock of wolverines as well as a sufficient range, food supply, and natural habitat to assure the future perpetuation of this vanishing species.

CANADA OTTER

Lutra canadensis canadensis [SCHREBER]

GENERAL APPEARANCE.—River otters are large aquatic weasels with long slender lizardlike bodies and long tapering tails. This animal has short powerful legs and claws. The feet are webbed and admirably adapted for swimming. The under fur is short and well protected by numerous strong glistening guard hairs. The pelage of the otter is very dense and the pelt makes a most durable fur. In color the animal is a uniform rich glossy brown above and a somewhat lighter brown beneath. The lips and cheeks of this otter are grayish. Size, large; length, 44 inches; tail, 14 inches; hind foot, 4.5 inches.

IDENTIFICATION.—The only other aquatic animal with which the river otter is likely to be confused is the beaver which has a wide flat scaly tail and a sturdy corpulent body. When the two animals are swimming and their bodies are submerged, the otter can be distinguished from the beaver by its more rounded or spherical shaped head. Another means of distinguishing one from the other of these two animals is by noting the actions of each species when alarmed. The otter dives quietly or sneaks off while the beaver whacks the water with his tail.

DISTRIBUTION.—River otters were formerly found in most of the larger rivers of North America but they have disappeared from many of the populated regions. In the McKinley region a few otters still occur along the larger rivers.

HABITS.—Otters are great wanderers. As has been stated their real habitat is along the larger streams where fish are abundant; however, at times they invade the small lakes and ponds bordering the northern boundary of the park and signs of them are reported from time to time within the park.

Mr. and Mrs. John E. Anderson, who resided for many years at Wonder Lake, recently assured me that otters were definitely known to occur in the area which was formerly outside the park along the north boundary near Wonder Lake. This area has recently been added to the park.

KENAI RED FOX

Vulpes kenaiensis [MERRIAM]

GENERAL APPEARANCE.—The Kenai fox is the size of a water spaniel. Its general color is pale red which becomes bright rusty red above. The dark brown stripe down the front of each leg and the same dark coloration on the outside of the ears appear black when the animal is seen in the

field. The tail is large, decidedly bushy, and has a conspicuous white tip. The cross, silver and black foxes are merely color phases of the red fox. Length, 50 inches; tail, 16 inches; hind foot, 7 inches; ear, 4 inches.

IDENTIFICATION.—Their reddish color makes these animals quite conspicuous. When the fox is seen running the bushy tail which is about half the length of the animal's body is held in a horizontal position. The call note of this fox is a characteristic coughlike, muffled bark.

DISTRIBUTION.—Red foxes are abundant in McKinley Park because of the protection they receive there. Food in the form of squirrels, rabbits, mice and ptarmigan, is sufficient to support a large fox population. In the month of June we located half a dozen fox dens containing young. Two of these dens which had been used for many seasons were close to the main highway and visitors to the park were thus afforded an excellent opportunity to study "Reynard" at home. Two dens were found on the Sanctuary River above the bridge; two others were located beside the highway at the East Fork of the Toklat River.

HABITS —Red foxes forage about during broad daylight, even at midday. On June 1, at 11 o'clock in the morning while I was standing motionless watching a bird, a large male fox came trotting along down the trail. He came up to within 50 yards of me, paused a moment and then, after stopping at a spruce tree, trotted away as contentedly as a dog does in his own barnyard. On July 9, 1926, at 9 o'clock in the morning we surprised three adult red foxes that were hunting together. When we first sighted the foxes over the brow of a hill, they were not more than 100 feet distant. In a few minutes they were almost out of sight; each was headed in a different direction over the open tundra.

We found that breeding dens of foxes in the McKinley region were usually located in sandy knolls that afforded easy digging and sunny south-facing exposures (fig. 47). At each den there were from 4 to 10 large burrows. These burrows were 8 or 10 inches in diameter and each was connected underground with the other. That there was intercommunication was proved repeatedly for a fox pup would disappear down one burrow and would reappear suddenly at another burrow entrance perhaps 20 feet from the place of disappearance.

As soon as the fox pups are able to scramble about to some extent they venture out a few feet from the burrow entrance and romp together and play as if at hide-and-go-seek. In doing this they make well-defined little trails through the grass which average 4 inches in width and which lead from one hiding place to the next.

We found other beds and romping places in the tall grass and by watching

Figure 47.—THIS BREEDING DEN OF THE KENAI RED FOX, LOCATED ON A WARM SANDY KNOLL, WAS USED BY FOXES IN BOTH 1926 AND 1932.
Photograph taken June 18, 1932, Savage River. *W. L. D. No. 2971.*

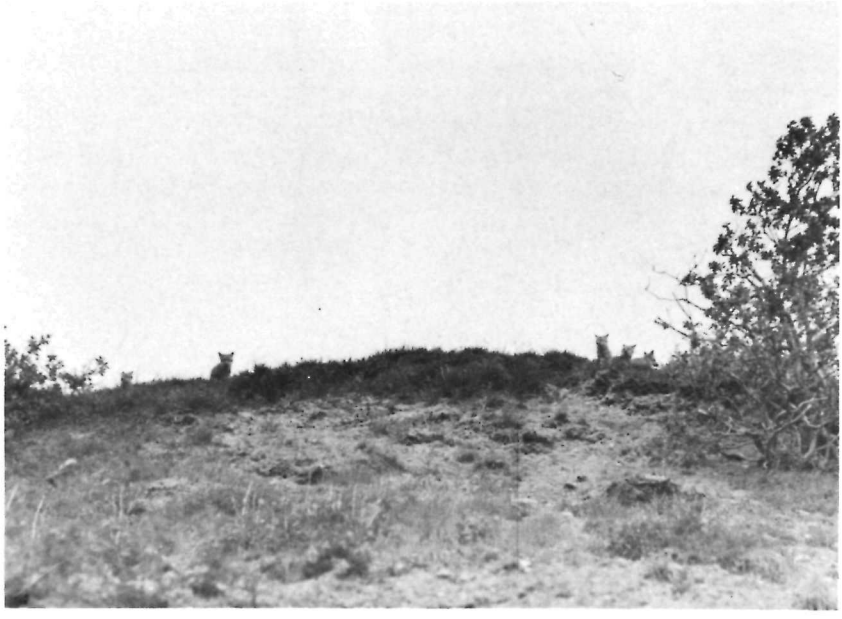

Figure 48.—FIVE OUT OF A LITTER OF SIX KENAI RED FOX PUPS NEAR THE ENTRANCE TO THEIR DEN. *Photograph taken July 8, 1932, Toklat. W. L. D. No. 2669.*

with binoculars learned that during the midforenoon the young foxes spent considerable time stretched out sunning themselves in such beds.

On July 8, 1932, a red fox den was visited which was located on a high south-facing bank about 2 miles beyond the Toklat River bridge. There were four reds, one brown, and one cross fox pup in this litter. Although these young foxes were nearly half grown they were so curious that they came out of their den and looked about cautiously (fig. 48). We climbed up and sat down a hundred feet to one side of the den. The fox pups came quietly out. They advanced under cover of a thicket of willows until they had approached to within 10 feet of us in their effort to discover what manner of being had intruded their home sanctuary. One pup stood in an opening with his tail raised sniffing the air many times in an effort to get our scent (fig. 49). Fresh tracks of a large timber wolf which had been made since the previous day's rain were found leading down a ridge directly to this fox den. Investigation showed that the wolf had visited all of the numerous entrances but had made only a slight attempt to dig the fox pups out of their underground shelter.

Figure 49.—ONE KENAI RED FOX CAME WITHIN 10 FEET OF US, SNIFFING THE AIR IN AN ATTEMPT TO GET OUR SCENT. *Photograph taken July 8, 1932, Toklat. W. L. D. No. 2673.*

On May 21, 1926, we made our first visit to the fox den on Savage River near the main transportation company's camp and found, from numerous small footprints in the sand, that the young were able to come to the entrance of the den (fig. 50). Upon our close approach, we heard the mother who was in the burrow give three low warning cough notes to her pups and, although we retired to a distance and waited an hour, none of the foxes ventured out. On June 4, one of the fox pups stumbled into a squirrel trap that was set near the den. This young fox was about one-third grown. It was covered with soft, downy underfur through which protruded a few long overhairs. These were scattered over the head, neck, and sides. On June 11, the mother fox of this brood was seen close at hand as she hunted for meadow mice along the river bottom. On this date she was extremely thin and ragged, presumably from nursing a litter of young.

On June 16, another brood of young foxes was found at the margin of a lake near the Sanctuary River. Two young foxes about two-thirds grown, one a red and the other a cross, romped and played about the mouth of the den.

By July 8, the fox pups in the den on Savage River were old enough to leave their den and to follow their mother about on foraging expeditions far afield. Careful watch showed that they did not return to the home

Figure 50.—NUMEROUS SMALL FOOTPRINTS AT THE ENTRANCE TO THEIR DEN INDICATED THAT THE KENAI RED FOX PUPS WERE ABLE TO WALK.
Photograph taken June 18, 1932, Savage River. *W. L. D. No. 2970.*

den to live after this date. By the first of August the young foxes were nearly grown and, although able to forage on their own account, continued to follow their mother about for some time (fig. 51).

As far as we could determine, the main burden of providing food for the pups fell on the mother. The father fox usually hunted far afield. This may have accounted for our failure to see him bring home food to his mate or to the young.

An excellent index to the food of foxes at this season of the year was had by examining remains of birds and mammals that we found scattered about the several fox dens. In enumerating such material we found that the remains of Mackenzie varying hares were most numerous and that the remains (ends of wings) of willow ptarmigan were almost as numerous. Within a hundred feet of one fox den we found the remains of 25 rabbits and 20 ptarmigan. Nearly all of the ptarmigan were males. The wing tips of a few Alaska longspurs, Gambel sparrows and tree sparrows were also found at the fox den. With the aid of binoculars I watched the red foxes

Figure 51.—A NEARLY GROWN KENAI RED FOX. ALTHOUGH IT WAS PHOTOGRAPHED IN JULY, THIS FOX WAS ONE OF A PRECOCIOUS LITTER AND REPRESENTS THE NORMAL GROWTH AS OF AUGUST 1. *Photograph taken July 8, 1932. W. L. D. No. 2674.*

as they hunted and found that meadow mice were captured more frequently than any other mammal. These mice were swallowed whole with little mastication and as a result their remains were found only in the fox feces. Young Nushagak ground squirrels were also captured in considerable numbers by the foxes. Among the larger mammals we found that a Dall sheep which had been killed and buried by a snow avalanche at the head of Savage River had been eaten by foxes when the melting of the snow brought the carcass to the surface.

On the Sanctuary River on June 16 we found the horns and skeletons of two large caribou bulls. They had gotten their antlers so firmly locked in a fight that they had been unable to pull apart and both animals had succumbed. This episode had transpired during the month of October, previous to our visit the following June. Fox droppings about the caribou skeletons showed that the red foxes had been quick to take advantage of this windfall and had licked the bones clean (fig. 64). On July 8, 1932, I found where the front leg of a young caribou which had recently died had been dragged by a fox 400 yards to its den.

As has been said, the highly prized silver and cross foxes are merely

individuals of varying color which are likely to be found in any litter of red fox pups.

Although both hunting and trapping are forbidden in Mount McKinley National Park, during the winter of 1925–26 an enterprising trapper operated outside and along the northern boundary. He caught $1,500 worth of fur, mostly foxes of the finer variety. Thus it will be seen that the park acts as a breeding reservoir for foxes from which a surplus travels over the boundaries of the park each winter and is caught by trappers.

NORTHERN COYOTE

Canis latrans [SAY]

GENERAL APPEARANCE.—The Northern coyote is the largest of its kind. It is about the size of a slender collie dog. The tail is black tipped, large, and bushy, and less than half the length of the body. The ears are long and pointed. In coloration the coyote is grayish above and buffy on the under parts. It has a high-pitched yapping or quavering bark. A single coyote may so modulate its voice as to lead a person listening to believe that several coyotes are all howling together. Males: length, 49 inches; tail, 16 inches; hind foot, 8.3 inches.

IDENTIFICATION.—The small tracks, slender build, long ears, and high-pitched broken call of the coyote cannot be easily confused with the large tracks, stocky build, short ears, and sonorous howl of the timber wolf. The coyote is larger, shaggier, and grayer than the red fox. Its tail is black-tipped and is relatively smaller than that of the red fox which is white-tipped.

DISTRIBUTION.—Coyotes of several species are found over most of western North America. In recent years the coyote seems to have extended its range in the McKinley region and become more abundant. With the increase in coyotes there has been an increase in the wolf so that common factors may possibly be operating on both populations. It is thought by some that the coyote extended its range into the interior of Alaska by following up the construction camps along the Alaska Railroad, building of which was completed in 1923.

My earliest record in McKinley Park is 1926. For several days during the winter of that year, a coyote remained about the home of John and Paula Anderson, at Wonder Lake. Some weeks later a coyote, probably the same individual, was killed by Edward Gern on the East Fork of the Toklat River. I later examined the skull of this coyote. Sheldon, who spent about a year in the region in 1907–8, makes no mention of the coyote.

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HABITS.—The pioneering spirit is strong in the coyote. In 1932, upon my second visit to Mount McKinley National Park I found that the coyote had increased in numbers until it was able to compete successfully with the Mount McKinley timber wolf and to actually invade its territory. In a similar way the coyote was found to be a serious competitor of other native carnivores for food, particularly to the Kenai red fox and to the Mount McKinley wolverine—both of which are important native members of the park fauna.

On May 25, 1932, I visited the main mountain sheep lick on Ewe Creek and found that although sheep were plentiful on the cliffs near the lick, their tracks showed that they had been afraid, presumably because of the presence of the coyotes, to cross the half-mile of open rolling ground that lay between them and the lick. Near the lick clear evidence was found that a coyote had recently run down and killed a yearling sheep.

Earlier in the spring when heavy snows and a frozen snow-crust drove the Dall sheep down out of the mountains to the lower rolling foothills, the coyotes, which were able to travel on the crust, had killed many of the sheep because of the fact that the sheep could not travel on the crust and had broken through and floundered in the deep snow.

On June 16, 1932, I watched a band of 80 ewes trying to cross Jenny Creek from their winter to their summer range. Many of these ewes were heavy with unborn lambs and all were very nervous. I watched them make several unsuccessful attempts to cross the valley. Every time they reached a certain area which was covered with low brush they became frightened and wildly stampeded back to the protecting cliffs. The cause of the trouble was found to be, apparently, a large gray coyote which was hiding in the brush. From this vantage point he tried to rush out and capture the passing sheep.

With the coyote menace to Dall sheep is the possibility that the coyote may displace other native carnivores. We cannot state with certainty that outside of Alaska a half dozen wolves are to be found in all of the remaining national parks and only two of these parks report wolverines as definitely present. Therefore the wolves and wolverines of the Mount McKinley region greatly enrich the general fauna of the whole national park system and should be treasured accordingly.

Although future information may modify the attitude of the National Park Service toward the coyote in Mount McKinley National Park, the present policy is expressed on pages 47 and 48 of Fauna of the National Parks of the United States No. 1, published in May 1932. Briefly this is as follows:

The spread of the coyote is a difficult and insidious problem. The reasons for its sudden spread over vast new territories are too controversial to be discussed here, but this outward movement is certainly associated with the changes which human populations have wrought. In Mount McKinley National Park its invasion is looked upon with great alarm.

Mr. Stokely Ligon's analysis of the problem, which applied here very well is essentially this: The coyote is beneficial in its own range and habitat; but when it gets outside of its own range, as it has done many times, it becomes a different animal and is destructive.

The coyote, where it is native to the area, has as much right to exist as any other member of the park fauna, but in relatively small areas such as Mount McKinley, where the wildlife is of great importance, it is impossible to preserve that wildlife and allow the encroachment of exotic predatory species or abnormal numbers of the native ones from the outside.

The logical course of action seems to be this: If coyotes are present in a park in greater numbers than formerly but give no indications of unusual damage, they should not be molested. We do not know enough, as yet, about the causes of their increase to justify steps against it. In Mount McKinley, where the animal life is of great importance and where the coyote does not belong, every safe step should be taken against this encroachment as an exotic and an alien.

George M. Wright has pointed out that such control measures of the coyotes will protect the native wolf, wolverine, and red fox. As control measures in the proper hands will be restricted to the methods described above and will be absolutely selective, the native carnivores will be adequately safeguarded.

MOUNT McKINLEY TIMBER WOLF

Canis pambasileus [ELLIOT]

GENERAL APPEARANCE.—The Mount McKinley timber wolf is about the size of a very large police dog. Its body is more than twice as long as its thick bushy tail. Generally it is gray in coloration but variations from black to light cream color are common. The ears are short and erect and are not as long nor as pointed as are the ears of the coyote. Males: Length, 66 inches; tail, 18 inches; hind foot, 11 inches.

IDENTIFICATION.—This species is the largest of the *Canidae* or dog tribe. Their short stubby ears distinguish the wolf pups at once from coyote pups, which have tall pointed ears. The call of a real timber wolf is a long-drawn-out, low-pitched resonant howl, "Ow—ooo—o-o-o." It resembles the mournful howling of certain Alaskan sled dogs, but it should never be confused with the shrill broken yapping or barking of the coyote.

On July 8, 1932, at Toklat I measured the track of a large wolf. It was a full impression made in firm mud and I found it to be 5⅛ inches long and

5⅛ inches wide. The tracks of small timber wolves cannot always be distinguished from those made by sled dogs.

DISTRIBUTION.—Under primitive conditions timber wolves were present over much of the northern half of North America. Out of all of our national parks in the western United States is is doubtful whether more than two of these parks now contain any timber wolves. Mount McKinley, our largest "wilderness" park, is the only national park that has an ample breeding stock of timber wolves.

HABITS.—At 10 o'clock in the evening on July 26, 1926, as we returned to our base camp on Savage River, we found two timber wolves searching for scraps of food that had been thrown out. They watched us closely and would not allow us to approach closer than a hundred yards of them. At this distance their stubby ears distinguished them from coyotes and their furtive behavior distinguished them from sled dogs. Later in the night a wolf was heard to howl repeatedly. This call note was a low-pitched resonant and, as has already been said, long-drawn-out howl that tapered off in volume gradually toward the end. The distant mellow call of a timber wolf is one of the most soul-stirring sounds to be heard in the far north.

In 1932 I found that wolves were much more numerous and much tamer than they were in 1926. In fact, in 1932 one or more wolves were seen on each trip that I made out into the park.

On July 11, near Little Stony Creek, Mrs. Dixon and Mrs. Edmunds watched a timber wolf chase a young caribou. At 5 o'clock in the afternoon a yearling caribou came running and panting down the little valley. It was hard pressed by a large black timber wolf. When first seen the wolf was about 60 yards behind the caribou and was gaining rapidly on it. Each time that my wife and Mrs. Edmunds shouted, the wolf would stop for a moment, but the caribou kept steadily on down the winding valley. The wolf continued to gain by "cutting across lots", so to speak, while the caribou followed the winding stream. When last seen the caribou was spent and staggering and the wolf was closing the gap. Whether or not the caribou was brought to bay and was then able to ward off the attack of the wolf was not determined.

At times during the winter when food is scarce the adult rams wander out upon the rolling hills in search of food and fall prey to the wolves. In hunting Dall sheep the wolf usually gets above the band of sheep and waits until some of them wander away from the safety of cliffs or other rugged broken ground. Then the wolf creeps forward and makes a quick dash down the slope endeavoring to catch one of the sheep before it can reach the

safety of the nearby crags. Sheldon (1930, p. 315) records nine instances where wolves hunted sheep in this manner and he says "I saw no signs of any other method of hunting." The wolves, Sheldon observed, apparently had not been very successful, for he goes on to say, "There was no evidence that a wolf had caught a sheep. . . ."

On June 1, 1932, I examined and photographed a large Dall ram which, judging from tooth marks made in both flesh and bones, indicated that the ram had been caught unawares while in the open and had been captured and killed by a timber wolf (fig. 52). The carcass was well preserved. The teeth of this ram showed that he was in full prime and vigor and the annual growth rings on his horns indicated that he was about 8 years old.

It has been our experience at Mount McKinley that wolves normally capture Dall sheep by hidden approach and sudden surprise rather than by means of a long chase. Ranger Lee Swisher, in a letter of November 21, 1932, states: "From my observations of mountain sheep and caribou killed by wolves during the winter I have yet to find a case where the wolves chased their victims more than 200 yards. Last winter I compared the distance of leaps made by an old ram and of the wolf that caught him. For a short distance their leaps were approximately the same (16 feet). When the old ram struck a patch of smooth ice he lost out in a few jumps."

I have found that in Mount McKinley Park the mountain sheep become excited and nervous when any person gets above them or between them and the protecting cliffs. On the other hand, once they have gained the safety of some rocky wall they will stand or even lie down and permit a person to approach them quite closely from below.

Prior to 1926 no wolves were known to remain or to breed in the park. Breeding dens are usually to be found located at low elevations in some enlarged fox burrow or in a warm sheltered cave at the base of a south-facing cliff. On June 12, 1932, at a den near Double Mountain, I kept close watch over a litter of four pups. Food remains at this den indicated that several mountain sheep had been eaten. Observations showed that the mother wolf had carried food as far as 12 miles to her pups.

At the present time the wolf is common in the park. Probably no other animal will give to the park visitor the wilderness thrill that comes from a glimpse of the wolf or a night pierced by its lone howl.

CANADA LYNX

Lynx canadensis canadensis [KERR]

GENERAL APPEARANCE.—A typical bobtailed cat about the size of an Airedale. The legs are long; the feet are large; the tail is very short and it

has a black tip. The ears have black tufts and the fur is long and silky. The general coloration of this animal is gray. A large female which was killed by Sheldon on the Toklat River on May 24, 1908, measured: Length, 37 inches; tail, 4.75 inches; hind foot, 9.75 inches.

IDENTIFICATION.—The stubby bobtail and tufted ears of the lynx serve to distinguish it at a glance from all other animals in the park. In winter the soles of the broad feet are thickly padded with hair so that the lynx leaves a larger track in the snow which is more indistinct than the track of the coyote or the red fox, and also larger than the imprint in the sand.

DISTRIBUTION.—It is distributed generally over boreal North America. In Mount McKinley Park the lynx is generally found in timbered areas but when hard pressed by hunger it may be found above timber line and on the open tundra. The lynx population is rather closely dependent upon the number of varying hares present in a locality.

HABITS.—The Canada lynx is an animal that captures its prey by stealth—by hidden approach and sudden surprise. In order to make this type of

Figure 52.—REMAINS OF AN 8-YEAR-OLD DALL SHEEP RAM WHICH, IN FULL PRIME AND VIGOR OF LIFE, HAD BEEN CAUGHT ON AN OPEN RIDGE AWAY FROM CLIFFS AND KILLED AND EATEN BY TIMBER WOLVES.
Photograph taken June 1, 1932, Sanctuary Divide. *W. L. D. No. 2699.*

hunting a success there must be some sort of cover. For this reason the lynx is normally found in the spruce woods or in the willow thickets of the McKinley region where the rabbits are most numerous.

During seasons when varying hares are scarce the lynx turns to other game. Thus a fat female lynx killed May 24, 1908, by Charles Sheldon, had its stomach full of mice and one ground squirrel. In the early spring lynx tracks in the snow showed that the big cats had also been following ptarmigan through the dense willow thickets.

The most surprising aspect of all the food habits of the lynx is the fact that during severe winters this animal will actually attack and kill a mountain sheep. On December 8, 1907, near the Toklat River, Charles Sheldon encountered a male lynx which weighed 20 pounds. It was crouching beside a half dead 20 months-old ram. Fresh tracks in the snow showed that the lynx had crept down upon the sheep from above and had laid low on a ledge over a gully until the young grazing ram had come within range. Then the lynx had leaped upon the sheep's back. It had reached forward and had bitten the ram's right eye until it had gouged it out. The ram's left eye had also been badly chewed but the eye had not been completely torn out of the socket. Again, on January 3, 1908, near the north base of Denali, Charles Sheldon found a ewe in her second year that had likewise been killed by a lynx which had sprung upon her and had completely gouged out her left eye. Sheldon explains that the thick long hair which covers a sheep's body and neck in winter would prevent a lynx with its small jaws from attempting to attack the sheep's body. The eyes therefore are the most vulnerable point of seizure for the lynx.

The lynx is a good swimmer and has been known to swim across the Yukon River.

In speaking of the cry of the lynx Sheldon says (1930, p. 133), "It was a rather low catlike 'meow' somewhat prolonged and repeated three times." Out of the many months spent in Alaska and the Yukon this was the one and only time Sheldon ever heard a lynx call.

The Canada lynx is one of the rarer mammals in Mount McKinley Park. After several good rabbit years they become more numerous and then decline in numbers as the rabbits become less abundant.

NORTHERN HOARY MARMOT

Marmota caligata caligata [ESCHSCHOLTZ]

GENERAL APPEARANCE.—The northern hoary marmot is the northern representative of our common ground-hog or woodchuck in the States. It is a large, chunky rodent with strong black claws which are adapted to

digging. Its tail is bushy and is less than half the length of the animal's head and body. The forward half of the hoary marmot is a clear, grayish-white but the hind part and tail are tinged with brown, particularly on the belly, rump, and tail. The ears are small and round, scarcely extending above the hair of the head (fig. 53). The feet are black.

Alaskans call marmots "whistlers" from their habit of announcing an enemy's presence by uttering a shrill, piercing whistle.

Length, 27.5 inches; tail, 7.5 inches; hind foot, 4.1 inches; ear from crown, 0.7 inch.

IDENTIFICATION.—Northern hoary marmots are the largest rock inhabiting rodents in the park. Their chunky build, gray shoulders and almost black areas on the top of the head, together with their piercing "traffic-cop" whistle, make their identification easy.

DISTRIBUTION.—Marmots are rock dwellers and rarely stray far away from sheltering granite boulder piles. We found that the Savage River Canyon, about 3 miles below the main transportation company's camp

Figure 53.—AN OLD MALE NORTHERN HOARY MARMOT AT BAY.
Photograph taken June 13, 1926, Savage River. M. V. Z. No. 5018.

Figure 54.—A NORTHERN HOARY MARMOT, ALARMED AND READY TO TAKE REFUGE IN HIS DEN. AS PROTECTION AGAINST WOLVES AND BEARS, THE DEN IS LOCATED IN A ROCK PILE. *Photograph taken May 21, 1932, Savage River.* *W. L. D. No. 2677*

and along upper Igloo Creek, were the best places to look for them, for at one time we found as many as a dozen in one day. In McKinley Park marmots were found, for the most part, between elevations of 3,000 and 4,000 feet.

HABITS.—Under ordinary circumstances hoary marmots are usually seen on the top of boulder piles. However, during late spring while the females are nursing their young the male marmots sometimes wander from a quarter to a mile away from home. Thus on May 19 near the cabin on Savage River we came upon a large male marmot that was fully 400 yards from the nearest protecting rock slide. He was probably foraging for new pastures and, being taken by surprise, galloped down the road ahead of us. He loped along at about 5 miles per hour. When hard pressed he left the road, took refuge in a galvanized iron culvert under the road and refused to be driven from his safe retreat, although he stuck his head out now and then to see what the rumpus was all about. On May 27 we found a family of marmots in a boulder pile at 3,500 feet elevation (fig. 54). At one time a male rock ptarmigan, a cony, and two marmots were all

Figure 55.—THE GRASS LINING OF THE WINTER DEN IS DISCARDED WHEN THE NORTHERN HOARY MARMOT COMES OUT IN THE SPRING. NOTE THE SECURE LOCATION OF THE DEN IN SOLID ROCK. *Photograph taken June 6, 1932, Savage Canyon. W. L. D. No. 2679.*

sunning themselves together on top of a rock pile less than 50 feet square.

Marmots have numerous enemies with which to cope. Several times we found golden eagles in the act of swooping down upon unwatchful ground hogs. On June 12, 1932, at Double Mountain, the remains of a hoary marmot were found in a golden eagle's nest. These birds of prey appear to prefer half-grown marmots, while bears, wolves, and coyotes not infrequently capture the larger adults.

The young marmots are born early in May and half-grown young were observed on June 5. As soon as the young are able to be out, the clear "traffic cop" whistle of the old marmot is usually heard whenever a person approaches a rock pile that is inhabited by them. One old marmot that I watched crawled up on the very summit of a gigantic boulder. There he flattened himself out in a depression and lay concealed so that just the top of his head, including his eyes, showed above the rock. As he lay watching us his gray coat blended so well with the gray granite rock that he appeared to be merely a part of the boulder. By June 10 nearly all of the marmots have well worn paths leading from the dens in the rock piles

down into the meadows which are then becoming rapidly clothed with green vegetation.

Once in a great while a marmot goes adventuring and wanders far from home. Thus at 8 o'clock on the morning of June 9, we discovered a large male marmot about a pile of logs near camp. He must have come a long way because it was more than a mile to the nearest known marmot den. When he first saw us, he took off up the hill and, as he had a 50-yard start, we ran a distance of more than 300 yards before overtaking him. He then tried to escape detection by lying motionless, stretched out at full length. Finding that this ruse failed to work, he stood his ground on the open tundra. Here, with neck and tail extended, he fought with tooth and claw giving frequent shrill warning whistles. After taking several pictures of him (fig. 53), we watched him scurry back to shelter.

By the time the heavy fall frosts blacken the growing herbage, the marmots have lined their underground nests with shredded plant fibers and dry grass. When the snow falls they retire to their homes in the rocks where they spend the winter in hibernation. The following spring, the marmots come out of these winter nests while the nearby snowbanks still blanket the ground. Immediately upon leaving their dens these animals discard the grass lining of their winter homes (fig. 55).

The Indians of interior Alaska catch many "whistlers." They use the meat for food while the pelts are tanned and made up into fur robes and bedding.

Unlike varying hares, lynx, and mice, the marmot population of Mount McKinley National Park appears to fluctuate but slightly from year to year. Marmots may be found in fair numbers in suitable locations—such as Savage River Canyon—each season.

NUSHAGAK GROUND SQUIRREL

Citellus plesius ablusus [OSGOOD]

GENERAL APPEARANCE.—A fat chunky prairie dog-like squirrel weighing about 1 pound and measuring 10 to 12 inches from the end of its nose to the base of its tail. The tail is short, flat, and bushy, being less than half the length of the body. During the spring and fall the general coloration of the animal is grayish, but in the summer it becomes a rusty color on the forehead, cheeks, forelegs, hind legs, and under parts. The ears are very short (fig. 56). Length, 12.8 inches; tail, 3 inches; hind foot, 2 inches; ear from crown, 0.2 inch.

IDENTIFICATION.—When alarmed this squirrel has a habit of sitting straight up like a stick or picket pin (fig. 56). At close range the plump body, short

Figure 56.—AN ALARMED NUSHAGAK GROUND SQUIRREL STANDING UPRIGHT. NOTE THE GRAY WINTER COAT, SMALL EAR, AND SHORT TAIL.
Photograph taken June 20, 1926, Savage River. *M. V. Z. No. 5256.*

tail, small compressed ears, and the small white specks on its lower back distinguish it at once. This ground squirrel is the noisiest mammal in the park.

DISTRIBUTION.—It is distributed generally over the higher ground at the base of the Alaska Peninsula and along the Nushagak River, being most abundant just above timber line on warm, open, grassy hillsides in nearly every section of the park between 2,000 and 6,000 feet elevation. The Transportation Company's Camp on the Savage River is an excellent place to see ground squirrels.

HABITS.—The ground squirrels in the park hibernate during the winter. Charles Sheldon saw the last ground squirrels of the season at Toklat River on October 2, 1907. The first Nushagak squirrel reappeared the following spring on April 10.

By April 30, these squirrels usually begin to breed. On May 26, the first female was seen carrying nest material. On this occasion she was noted tearing an old grain sack to pieces with her teeth and dragging the

material into her nest under the ground. Three females which were killed on June 20 had each given birth to their young. On June 21 a squirrel was seen tearing an old strawboard box to pieces. It stuffed the material into its cheek pouches and carried the material to its burrow where it was used to make a nest. Nest renovation goes on after the young squirrels are born and it is not unusual to see a nursing female squirrel carrying bulky loads of dead grass, shredded bark or other dry vegetable material down her burrow and into the nest.

Ground squirrels have large litters of from five to eight young. Practically all of the young squirrels were born before June 30. Early-born young squirrels, nearly one-third grown, were seen running about by July 4.

Ground squirrels are particularly abundant at Sable Pass and at the head of Savage River. This was attested by the animals themselves and by numerous little craters left by grizzly bears where these carnivores had dug out the squirrels. Golden eagles levy a heavy toll on the squirrels as do also red foxes and other fur-bearers. It is our opinion, taking all factors into account, that the ground squirrels are the most important food supply of the meat-eating birds and mammals in the park. Daily, during the latter part of June, we counted more than 100 adult squirrels on an area half a mile wide and 2 miles long. This meant 50 families of squirrels per square mile by late summer. At the caribou camp on upper Savage River we found that more than 15 squirrels made their homes within a hundred yards of our tent.

Residents of Alaska call the ground squirrels "parka" squirrels because the natives prize the skins of these animals for making their summer "parkas" or coats. The parkas differ from our coats in that they usually have a hood attached and are made of reindeer skins. Too, they do not button down the front but pull on over one's head like a "slip-on" sweater.

"Parka" squirrels are exceedingly noisy, especially so when any winged or 4-footed enemy, such as an eagle or a grizzly bear, appears on their horizon. Visitors to the park will find that "parka" squirrels are quick to make friends with man and that they do not hesitate to exploit this relationship. Nothing edible is safe if left on the ground unless stored in metal squirrel-proof containers. Even the grizzly bears do not go through a poorly protected cache of food supplies more thoroughly than do the "parka" squirrels.

Much of these squirrels' time is spent in scolding and fighting among themselves. A good deal of this is bluff, but on occasion they stand up on their hind legs and fight "tooth and nail."

The red summer coat appears first on the head, then on the feet and back. By the 20th of July much of the gray winter pelage has been replaced by the red summer hairs, giving the squirrel a very mottled appearance (fig. 57). Even in late summer young ground squirrels of that season can be distinguished with ease from the adults by their paler, grayer color and softer downy coat.

Young ground squirrels are very greedy. At Igloo Creek camp on July 21, a red squirrel and a young ground squirrel were observed fighting over a crust of bread that had been thrown out. The red squirrel found the bread first. Then a young ground squirrel came along and made him drop it. A lively scramble ensued. The more active red squirrel ran in like a flash and knocked the ground squirrel over in an effort to drive him away. The ground squirrel was so busy eating that he did not take time to fight back; he continued to stuff himself with bread (fig. 57) until the last crumb was consumed. The red squirrel, on the other hand, ate a little bit of his crust. Then he scampered away and hid the remainder at different places in a spruce tree, usually placing bits of it out near the tip of a branch

Figure 57.—A NUSHAGAK GROUND SQUIRREL IN RED SUMMER COAT. NOTE THE SPECKLED BACK AND RUMP. *Photograph taken July 22, 1926, Igloo Creek. M. V. Z. No. 5260.*

in a cluster of needles well out of the reach of the nonclimbing ground squirrels and other rodents.

By the end of summer the ground squirrels become fat and lazy. The first real snowstorm in the fall finds them safely tucked away in their warm beds underground where they soon pass into a deep hibernating sleep which lasts through the entire winter. They are not seen again until the following spring when the bare ground begins to show through the snow.

In the spring when they again appear some of these hardy gound squirrels dig their way up through several feet of snow. They use their stout claws which are long and sharp when these animals first emerge from hibernation.

Contrasting the population of ground squirrels to that of varying hares, apparently the former population does not fluctuate so greatly from season to season as does that of the latter. The ground squirrels are an important food supply for grizzlies, fur bearers, and certain birds of prey.

NORTHERN RED SQUIRREL

Sciurus hudsonicus hudsonicus [ERXLEBEN]

GENERAL APPEARANCE.—The body is about the size of an ordinary Norway rat. The tail is nearly as long as the body and is flattened and plumelike. The upper parts of this squirrel are grayish in winter and reddish in summer; the under parts are lead color in winter and yellowish white in summer. The ears are well-tufted with hairs in winter but are only slightly so in summer. It has a distinct black stripe along the lower middle part of the sides in summer. The claws are compressed, sharp, and curved and are well adapted for climbing. Length, 12.5 inches; tail, 4.5 inches; hind foot, 1.9 inches.

IDENTIFICATION.—The tree-climbing habits, feathery plumelike tail, small size, reddish color, black stripe on the sides, and the white ring about the eyes (fig. 58), distinguish this squirrel from all other rodents in the park.

DISTRIBUTION.—Red squirrels inhabit the coniferous forests of boreal North America. The northern red squirrel is found throughout the park wherever there is a suitable growth of spruce trees. The camp of the transporation company on Igloo Creek is a good place to study this animal. Red squirrels may also be found in the spruce woods just back of the main camp of the transportation company on Savage River. At this latter place we found them numerous throughout the summer of 1926.

HABITS.—Without the lively northern red squirrel the silent spruce woods of the North would lose much of their charm. The well known "chirr"

Figure 58.—THE NORTHERN RED SQUIRREL COMES DOWN THE TREE WITH THE SAME AGILITY THAT HE CLIMBS IT.
Photograph taken July 21, 1926, Igloo Creek. *M. V. Z. No. 5248.*

or "trill" note of the red squirrel is one of the most characteristic sounds of the spruce woods in the park. These trees provide shelter and a safe home for the red squirrels during the stressful freezing storms of winter. The seed contained in the cones of the spruce tree is the staff of life for the red squirrel. Visitors to Mount McKinley Park frequently find the compact nests of this animal which are made of fibrous roots, moss, and shredded bark and are placed well up in the trees, and they mistake them for the nests of birds. One should not be blamed for making such a mistake because in location, size, and construction the nests are very similar to those built by birds except that the squirrels' nests are originally roofed over while the birds' nests are open.

A typical northern red squirrel nest was placed 16 feet up in a dense spruce tree. This nest was globular in shape and was 12 inches in diameter. Its walls were 4 inches thick and were made of twigs, leaves, and moss. A single hole through the side of the nest led to the inner cavity which was lined with the hair of the mountain sheep. Another nest was lined with caribou hair and ptarmigan feathers.

The red squirrel does not hibernate in winter as does its relatives the "parka" squirrel and the Northern hoary marmot. Instead, he is active during suitable weather throughout the winter season. It is true that during cold snaps he may retire to his warm nest for several days at a time, but such retirements are merely temporary and the squirrels are abroad again as soon as the weather moderates.

The red squirrels of the park have appointed themselves on the reception committee. They are among the first of the numerous animals in the park to make the acquaintance of visitors. If the visitors are backward, the red squirrels are willing to meet them more than halfway, even to the extent of coming into their camp at 3:30 in the morning to see what the strangers are going to have for breakfast. A picture was secured (fig. 59) of a friendly red squirrel that was bent on this very mission one morning. However, at times these squirrels have serious competition to cope with in their work of camp investigation. Their competitors are the Alaska jays which are commonly known as camp robbers. As previously described, on June 1, while we were camping in an old tent on the upper Savage River, we watched a red squirrel chase a pair of Alaska jays away from the tent. Every time a jay would alight in the top of a spruce tree near the camp the squirrel would look up at him for a moment and then, picking out the tree the bird was in, he would run up the spruce and jump at the jay in an effort to drive the intruder away. Frequently, just before the squirrel reached the jay the bird would hop or fly across to a nearby tree. The squirrel would then run out to the end of a branch and jump across to the adjoining tree, sometimes clearing between 4 and 5 feet at a leap. If the tree was so far away that it was impossible to bridge the gap by jumping, the squirrel would go down to the ground and then again single out and climb the tree where the bird was perched.

In seeking for an explanation of this unusual behavior we continued to watch the squirrel for several minutes after the bird had departed. The jay had not been gone more than 5 minutes before the squirrel was observed to remove some of his stored food, a piece of old cheese which we had thrown away, from a cache in one of the treetops. We thought that he showed considerable intelligence because he hid it in a hollow log where the jays would be much less likely to venture. It may have been professional jealousy between the robbers or, more likely, the squirrel was simply trying to drive the jay away from his stored food.

Red squirrels are sometimes very destructive to blankets and bedding which of necessity are kept stored in the ranger-patrol cabins along the park boundary line. When the ranger is absent on patrol duty these

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Figure 59.—THIS NORTHERN RED SQUIRREL CAME INTO CAMP AT 3:30 A. M. TO SHARE OUR BREAKFAST. NOTE THE WHITE EYE-RING AND LONG FEATHERY TAIL.
Photograph taken July 10, 1926, Igloo Creek. *M. V. Z. No. 5246.*

squirrels often get into the cabin by gnawing their way through the moss chinking between the logs that form the cabin wall. Once inside, they proceed to carry off all the portable food supplies, such as rice, dried fish or meat, and dried fruits. However, the greatest destruction is inflicted upon the bedding, which unless it has been carefully rolled up and hung by wires from the rafters, so that the squirrel cannot reach it, is torn to pieces and the inner filling, consisting of cotton, wool, or down is carried off by the squirrel to be used as a lining for his own winter nests, of which he usually has several. The squirrel's nests are well hidden under the dense drooping branches of protecting spruce trees which, in this instance, were located near the cabin. On one occasion a Northern red squirrel was known to have destroyed more than a hundred dollars worth of food and bedding in a few weeks. Food supplies and blankets can be protected by hanging them out of reach or storing them in squirrel-proof chests.

During excessively cold winters and in seasons when the crop of spruce cones is light the Northern red squirrels diminish in numbers. Since they are active all winter they run a continuous gauntlet of danger because of their enemies, for they are preyed upon by hawks, owls, martens, foxes, and Canada lynx. However, in spite of this, the red-squirrel population remains fairly constant from one season to the next.

CANADIAN BEAVER

Castor canadensis canadensis [KUHL]

GENERAL APPEARANCE.—The beaver is the largest gnawing mammal or rodent in Alaska. The eyes and ears are small; the tail is flattened, broadly paddle-shaped and covered with scales. The hind feet are large with a complete webbing between the toes. This animal is rich reddish-brown in color. The pelage consists of long glossy over hairs and a shorter dense under fur. Body length, about 30 inches; tail, 16 inches; weight, 40–65 pounds.

IDENTIFICATION.—The heavy body, aquatic habits, scaly tail, webbed hind feet, and large orange-colored protruding incisor teeth distinguish the beaver at a glance. Beavers are nocturnal and hence are usually not abroad much in the daytime. They may be seen swimming about at dusk, their bodies submerged and only the top portion of the head showing above the water.

DISTRIBUTION.—Formerly the beavers were found in lakes and streams over most of North America. The larger rivers in the park which head in live Glaciers and are full of silt are not inhabited by beavers. Possibly they are absent from these streams because of the silt. Along the headwaters of Clearwater and Moose Creeks in the northwest portion of the park there are numerous small clear lakes and ponds inhabited by beavers.

In 1932 we found two families of beavers with several houses or lodges in ponds along the side of the main trail near the lower end of Muldrow Glacier. We also found beavers all along the creek which empties into the north end of Wonder Lake.

HABITS.—Investigation showed that the building of dams and houses by beavers in the ponds of the park where these animals are found is the same as similar activities carried on by beavers elsewhere in central Alaska. Until about 1930, a family of beavers lived in a small pond between the Alaska Railroad and the Nenana River, about half a mile down the stream from McKinley Park Station. In June 1932, I found beaver cuttings, several well-built beaver dams (fig. 60), and a well-constructed beaver lodge in this pond. However, there was clear evidence that the beavers had all been killed about 18 months previous to my visit. Now that this area is inside the park, it is hoped that beavers will again be established and properly protected there.

At Wonder Lake on August 13, 1932, although it was high noon and the sun was shining brightly, I watched a beaver come out of this lodge and swim slowly about basking in the sun for more than an hour. At times

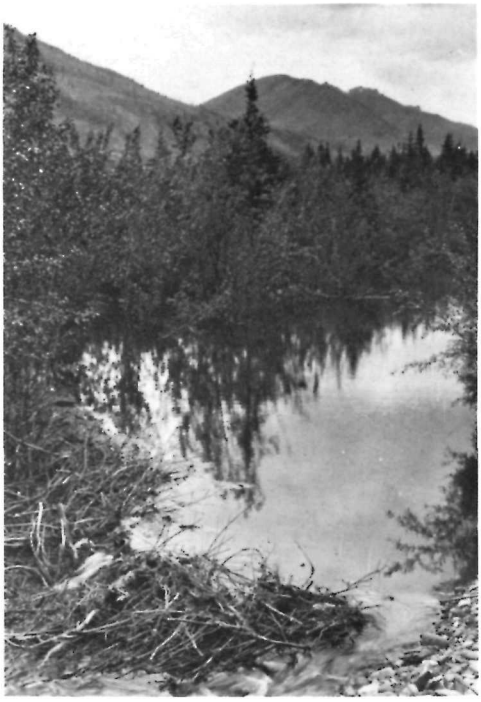

Figure 60.—A CANADIAN BEAVER DAM ON A SEEPAGE RIVULET. *Photograph taken July 1, 1932, McKinley Park Station.* *W. L. D. No. 2647.*

this full grown beaver swam up to within 50 yards of me. He was apparently curious but when he became alarmed he did not "whack" the water with his tail. Instead he submerged quietly and swam more than a hundred yards before coming to the surface.

Within the year a new beaver house had been built at the north end of Wonder Lake. This is an ideal place for visitors to see beavers and it is hoped that these animals can be protected and kept there in some numbers.

BOREAL WHITE-FOOTED MOUSE

Peromyscus maniculatus borealis [MEARNS]

GENERAL APPEARANCE.—A wood mouse of medium size. Its coat is distinctly bicolored. The upper parts are cinnamon and the under parts are creamy white. The ears are fairly large but not densely furred. The eyes are large and almost black. The tail is bicolored and short; it is less than half the body length. Length, 6.5 inches; tail, 2.7 inches; hind foot, 0.8 inch.

IDENTIFICATION.—The Arctic white-footed or deer mouse can be distinguished from the other mice of the region because of its bicolored body pattern and its relatively short bicolored tail.

DISTRIBUTION.—Deer mice are the most common of the small mammals which are found over much of temperate North America. The Arctic form of this mouse is found in the Canadian and Hudsonian zones along the headwaters of the Mackenzie and Yukon Rivers. In Mount McKinley National Park this species has been detected at low elevations only along the McKinley River.

HABITS.—While I was drying my wet clothes in a log cabin at the Kantishna Ranger Station on the afternoon of August 8, 1932, I watched a nearly grown Arctic deer mouse run along the floor behind the stove. It came within 5 feet of me and I saw it in a good light. The white under parts and bicolored tail identified it as a deer mouse. The unusually short tail placed it definitely as belonging to *borealis* and not to *hylaeus*. Traps set to capture this mouse caught only *Microtus* or meadow mice, which were abundant in the cabin.

The altitude at this point is about 1,900 feet and the plant association is typical of the upper Yukon River Basin. This is the only *Peromyscus* recorded for Mount McKinley National Park. It is believed to be rare there.

YUKON LEMMING

Lemmus yukonensis [MERRIAM]

GENERAL APPEARANCE.—Lemmings resemble wooly, short-tailed meadow mice, but the soles of their feet are hairy, lacking the bare tubercles found on the feet of meadow mice. The long pelage of the lemming is of a rusty color and is soft in texture. The ears are short, almost covered by the long hair of the head and neck. The tail is very short, being often less than the length of the hind foot. Length, 5 inches; tail, 0.7 inch; hind foot, 0.8 inch.

IDENTIFICATION.—The exceedingly short tail and, dorsally, the long, loose, reddish pelage distinguish the lemmings from all other mice found in the McKinley region.

DISTRIBUTION.—The lemmings are characteristic rodents of the treeless Arctic prairies over much of northern Alaska. They are abundant at times above timber line in Mount McKinley National Park, but they are almost, or entirely, absent during many seasons. Near Wonder Lake, in 1932, I obtained a single dried-up specimen.

HABITS.—In 1906, Charles Sheldon found lemmings and other mice to be rare in the Toklat region, but they were abundant there the following year. He states (1930, p. 121) that in 1907, "the lemmings bred in colonies of 5 to 12 holes close together, connected underground . . . At least two litters of young had been reared, and by the middle of August the females . . . contained from five to seven embryos each." The lemmings were active all day and were very tame, but whenever an Alaska jay flew near them all the mice suddenly rushed into their holes. Both jays and short-billed gulls were seen to dart down, pick up, and to devour young mice.

When the lemming population increases so that their food supply is exhausted swarms of these rodents leave for new pastures. Hawks, owls, foxes, ravens, gulls, jaegers, and other natural enemies of mice follow these fleeing hordes and prey upon them. At such times also disease often breaks out in the mice and reduces their numbers to a mere handful. Then the lemmings begin to breed up again and the whole cycle is repeated.

DAWSON RED-BACKED MOUSE

Evotomys dawsoni dawsoni [MERRIAM]

GENERAL APPEARANCE.—A small mouse with a broad rusty red back. The ears are short and but slightly longer than the fur. The eyes are small and the tail is fairly short, being less than twice as long as the hind foot. Length, 5.8 inches; tail, 1.3 inches; hind foot, 0.8 inch.

IDENTIFICATION.—The tail which is decidedly longer than the tail of the Yukon lemming and the bright red back and small size of this mouse distinguish it at once from the lemming which is the only other mammal in the park with which it is likely to be confused.

DISTRIBUTION.—Red-backed mice are found in the wooded territory over northern North America. In Mount McKinley National Park we found the Dawson red-backed mouse to be most abundant in the black spruce forests near timber line. This inhabitant of the woods was found to be the mouse which most frequently invaded and became resident in human habitations.

The population of red-backed mice, unlike that of the shrews, lemmings, and meadow mice, appears to be fairly constant and lacks any great cyclic fluctuations.

HABITS.—On May 21, 1926, in an old tent that had been used as a stable at Savage River, mouse traps were set. Three adults, and one immature mouse about two-thirds grown were caught. From this and other data it would appear that the red-backed mice are about the first mice to breed in the spring. Early on the morning of May 30, 1926, a mother red-backed mouse was seen to run across our cabin floor carrying one of her offspring in her mouth. The young mouse was grasped by the skin of its abdomen. While carried by its mother it curled up around her face. Its hind feet, tail, and nose were firmly pressed against the side of the parent's head. In the mother's haste to escape she dropped the young mouse. Upon examination it was found to be 2½ inches long and to weigh 12 grams. This little mouse had no sign of tooth marks where its mother had grasped it. The eyes had not yet opened although the little animal was well furred.

Tests proved that its sense of smell was very keen and was used in place of sight in locating its parent.

Red-backed mice were also found at Headquarters, Igloo Creek, and at Copper Mountain well above timber line.

An adult female red-backed mouse with mammae which showed plainly that she was still nursing her first litter of young was trapped on June 1, 1926, on Savage River at 2,800 feet altitude. Further examination of this nursing female showed that she contained eight small embryos. This circumstance leads us to conclude that at least two, and perhaps—as Charles Sheldon has suggested—even three litters of young may be raised in a single short summer season.

DRUMMOND MEADOW MOUSE

Microtus drummondi [AUDUBON and BACHMAN]

GENERAL APPEARANCE.—A short chunky mouse of medium size. The length of the tail is about one and one-half times the length of the hind foot. The ears are short and well concealed in the fur of the head and neck. The fur is fine and soft in texture and is brownish in color. Drummond voles are active during the day as well as at night. These mice make well-worn narrow trails through the grass and green vegetation. Length, 5.4 inches; tail, 1.5 inches; hind foot, 0.7 inch.

IDENTIFICATION.—The Drummond meadow mouse is larger and browner than the Toklat meadow mouse, and it is smaller than the large and grayer interior meadow mouse. It is about the same size as the Yukon lemming, but it lacks the rusty red of the lemming and its tail is longer than its hind feet.

DISTRIBUTION.—Drummond voles are found from the southern boundary of Canada north almost to the Arctic Ocean and from Hudson Bay to central Alaska. In the McKinley region *drummondi* has been found on the Toklat and Savage Rivers at or near timber line. It is most numerous along the margins of willow thickets.

HABITS.—In 1906, Charles Sheldon found this species of mouse to be rare in the Toklat region, but in the fall of 1907 he found this and other species of mice to be abundant near his winter cabin. This coincides with my own experience in the same region, for in 1926, I found meadow mice of this and other species to be numerous, whereas in 1932, they were extremely rare or absent in the same areas. Therefore, one visitor to Mount McKinley Park might find Drummond meadow mice to be exceedingly numerous while another later visitor might not be able to find them present at all.

INTERIOR MEADOW MOUSE

Microtus operarius endoecus [OSGOOD]

GENERAL APPEARANCE.—A fairly large meadow mouse with a tail nearly twice the length of its hind foot. The summer pelage is rough, short, and grayish in color. The ears are fairly large. Length, 7 inches; tail, 1.6 inches; hind foot, 0.8 inch.

IDENTIFICATION.—The interior vole or meadow mouse is almost as large as the yellow-cheeked meadow mouse but it lacks the yellow patches on the cheeks and at the base of the ears which are characteristic of the latter species. The interior meadow mouse is larger and yellower than the Drummond meadow mouse and is much larger than the Toklat River vole.

DISTRIBUTION.—The habitat of this species is central Alaska. In the McKinley region we found the interior meadow mouse only in wet meadows in the timbered or wooded areas along the Savage, Toklat, and McKinley Rivers.

HABITS.—On June 20, 1926, along the upper Savage River I trapped two adult females each of which contained six well developed young that would have been born in a few days. Two young of previous litters, though born earlier that same season, were also trapped in the same runways in which the adult females had been taken. These young mice were 3½ inches in length and were nearly half-grown. Their coats were shorter and browner than the coats of their parents.

In our experience we have found the interior meadow mouse to have a very restricted local habitat and although it is widely distributed it is never found in large numbers. Too, they do not seem to fluctuate in numbers from season to season to the same extent as do some of the other mice.

TOKLAT RIVER VOLE

Microtus miurus oreas [OSGOOD]

GENERAL APPEARANCE.—A small yellowish meadow mouse with a very short tail which is only slightly longer than the animal's hind foot. The ears are short and nearly hidden in the dense fur. This vole inhabits the dry open tundra. Length, 6 inches; tail, 1 inch; hind foot, 0.8 inch.

IDENTIFICATION.—The small size, short tail and yellowish or ocherous color of this vole serve to distinguish it at once from the other meadow mice of the region.

DISTRIBUTION.—The main Alaska Range of south central Alaska is the

home of the Toklat River vole. In Mount McKinley National Park it has been found along the bare ridges of the main range as high as 4,600 feet and along the Toklat and Savage Rivers' rocky gravel bars as low as 2,800 feet.

HABITS.—Early in June 1926, we found these mice, as has been stated, to be abundant on the open gravel bars along the Savage River. There were no regular *Microtus* runways, only small clean-cut burrows about an inch in diameter which ran 2 or 3 inches under the moss and which led underground to their nests made of dry grass.

During the first half of June these mice were mating. They were exceedingly active during the entire 24 hours of each day. On June 12, 1926, an adult female was found to contain eight foeti, each three-fourths of an inch in length and nearly ready to be born. Another female was found to contain seven embryos on June 29; and four other females trapped between June 14 and June 26 contained six embryos each. Sheldon found that as many as three litters of young were raised in a single season. Our own studies corroborate Sheldon's findings. Thus, this species has a relatively high rate of reproduction.

Sheldon reports (1930, p. 121) "Twice I saw a jay dart quickly down, pick up a young meadow mouse and fly to a tree and eat it."

On June 11, 1926, we found numbers of short-billed and herring gulls sitting about a meadow inhabited by many Toklat River voles. The gulls were quietly waiting, either singly or in small groups of three or four, watching for the meadow mice. The young voles are not suspicious and they run about freely in the daytime. As I have said before, it is truly a wonderful sight to see a whole dark green field dotted with white-breasted gray-backed gulls motionless as statues. It is interesting to note that on June 2, 1932, this same area was still covered with 6 feet of snow.

In the fall of 1907, Sheldon found these and other mice to be "incredibly abundant" in the Toklat region where they had been relatively scarce the previous season. In 1932, I was unable to find or to catch a single vole of this species in the identical areas where I had found them so abundant in 1926.

YELLOW-CHEEKED MEADOW MOUSE

Microtus xanthognathus [LEACH]

GENERAL APPEARANCE.—A very large meadow mouse with bright rusty yellowish patches on the side of the nose and at the base of the ear. The general color of this mouse is dark sepia on the dorsal surface and dusky

gray on the belly. The tail is faintly bicolored and about twice the length of the hind foot. Length, 8.5 inches; tail, 2 inches; hind foot, 1 inch.

IDENTIFICATION.—The large size and the distinct yellow patches on the cheeks and at the base of the ears are the best field characters for this species.

DISTRIBUTION.—This meadow mouse is found from central Alberta north to the Arctic coast and west to central Alaska. In 1907, Charles Sheldon found this species to be numerous on the Toklat River where he collected some specimens.

HABITS.—Very little is known regarding the habits of the yellow-cheeked meadow mouse in Mount McKinley National Park beyond the few specimens which Sheldon collected on the Toklat River. In our experience it is the rarest species of meadow mouse thus far found in the park.

NORTHWESTERN MUSKRAT

Ondatra zibethica spatulata [OSGOOD]

GENERAL APPEARANCE.—A large robust water meadow mouse. It has broad hind feet which are partly webbed between the toes. The scaly tail, which is about as long as the body, is compressed so that its vertical measurement is much greater than its width across. The muskrat's coat consists of long polished guard hairs and an under coat of soft dense fur which keeps out both the cold and water. The ears are short and well-concealed in the dense fur. Length, 21 inches; tail, 10 inches; hind foot, 3 inches.

IDENTIFICATION.—The aquatic habits and the webbed hind feet of this animal distinguish the muskrat from all other rodents in the McKinley region except the beaver which is a much larger animal with a broad tail. The beaver's tail is not compressed as is the Northwestern muskrat's tail; it is flattened.

DISTRIBUTION.—Muskrats always live in or near water. They occur over most of North America and are found from the Atlantic to the Pacific and from the Gulf of Mexico to the mouth of the Mackenzie River. In the McKinley region they have been found at Wonder Lake and at several of the other smaller lakes along the north boundary of the park, usually below 2,000 feet.

HABITS.—From time to time muskrats are captured by hawks, owls, and eagles. In some instances these birds have been known to carry their victims several miles before eating them. At the base of a rocky pinnacle on Savage River the remains, including the distinctive scaly tail, of a muskrat, were found on May 23, 1926. The skin had been dropped by some large

bird of prey after it had eaten the meat. This muskrat must have been carried in from a distance of several miles for there were no ponds or lakes within 3 or 4 miles of the place where the carcass was found.

The muskrat is rather rare in the park. It has never been found in numbers there.

ALASKA PORCUPINE

Erethizon epixanthum myops [MERRIAM]

GENERAL APPEARANCE.—A large robust tree-climbing rodent. It has short legs and stout curved claws. The upper parts of the body and tail are covered with a coat of sharp black-pointed yellow quills which are barbed at the tip and are partly concealed by the long yellow over hairs that cover the body (fig. 61). The porcupine has small rounded ears that are well concealed by the hairs of the head. It is the second largest rodent in the McKinley region. Length, 29.5 inches; tail, 8 inches; hind foot 3.5 inches.

IDENTIFICATION.—The slow-moving waddling form of the porcupine can be readily recognized either on the ground or in the trees. At close

Figure 61.—THE ALASKA PORCUPINE HAS SMALL EARS AND A PROTECTING COAT OF SHARP QUILLS, WHICH ARE HERE SHOWN ERECTED AND READY FOR COMBAT.
Photograph taken May 27, 1926, Savage River. *M. V. Z. No. 5092.*

quarters the sharp quills will dispel any possible doubt as to the animal's identity. Porcupine tracks show a canvas-like pattern where the sole of the hind feet comes in contact with dust or soft soil.

DISTRIBUTION.—Porcupines are widely distributed over North America wherever there are coniferous forests. In the McKinley region porcupines are well distributed through the spruce forests. They winter in the spruce trees but in the summer time they may be found out in willow thickets high above timber.

HABITS.—The most conspicuous evidence of the presence of porcupines is revealed by the whitened trunks of spruce trees, the bark of which is eaten extensively by these rodents during the winter. A porcupine may remain for weeks at a time in some sheltered grove of spruce trees.

On May 26, 1932, at the boundary cabin on Savage River, I found whole clusters of young spruce trees, from 2 to 6 inches in diameter, that had been killed by porcupines gnawing away all the bark near the base of each tree. Since the porcupines had selected the thickest clumps of these trees to work in, the result was a sort of natural thinning of the too thickly planted stands. In other instances isolated spruce trees showed that they had been killed by gnawing, but it is believed that such damage is nominal and natural, on the whole, in Mount McKinley National Park.

Men who drive dog teams on dangerous winter patrols do not love the porcupines, for the sled dogs are quick to attack these animals. The usual result is that the dogs in killing the porcupine get their mouths and feet full of the animal's quills and it takes hours of painful labor and endurance for both man and dogs before these quills are removed. It is accomplished with the aid of pliers, and not until the porcupine's quills have been extracted are the dogs again able to travel. Most sled dogs never learn to leave porcupines alone.

On the other hand, although a porcupine causes much annoyance by gnawing ax handles, saddle leather, boots, and other articles that have become impregnated with salt and that are therefore very appetizing to this animal, it may prove to be a veritable lifesaver to man. In the early spring of 1932 one of the members of the Cosmic Ray Expedition to Mount McKinley became lost while he was seeking aid for a sick companion. This man was unarmed, save for his alpine stock, and he told me that the meat of a porcupine, which was the only animal that he was able to capture with his alpine stock, was the principal item of food during the 3 weeks he was lost.

Wolves and certain dogs, and even red foxes, learn how to kill porcupines without getting themselves full of quills. In order to do this they

get hold of the porcupine's nose first and pulling backwards drag him out into the open. When the porcupine raises up and starts to escape they run in under the front of the "porky" and flip him over on his back. The porcupine's belly is his vulnerable spot since it is not protected by sharp spines as is the back of the animal. Taking advantage of this fact the wise wolf or fox is able to kill and eat the porcupine without being bothered by the quills.

There is good evidence that porcupines were rare within the park at the time of Charles Sheldon's visit to the region in 1907–8. By 1926, porcupines had increased so that they were no longer rare and by 1932 as many as three to five were encountered in a single day.

It is probable that protection which is now being given carnivores in Mount McKinley National Park will result in their increase. This in time will act as a natural check on the porcupine population and the result will be the restoration of a normal balance.

COLLARED PIKA

Ochotona collaris [NELSON]

GENERAL APPEARANCE.—A small, gray, bobtailed, rabbitlike animal about 7 inches in length; gray above and white beneath. Though akin to the rabbits, pikas are more like guinea pigs in general appearance since they have short legs, chunky bodies, rounded ears, and "bobbed" tails (fig. 62). Pikas are also known as conies or little chief hares and they are the most intriguing and interesting of all the small mammals of Mount McKinley Park. The soles of the pika's feet are covered with dense felt-like pads of hair which enable it to hop about noiselessly. Were it not for their telltale shrill little "bleating" cries, they would quite escape detection since their color blends perfectly with the gray granite rocks on which they perch and their beady black eyes and sharp ears are keen to sense approaching danger. Length, 7 inches; hind foot, 1.2 inches.

IDENTIFICATION.—Pikas are smaller than ground squirrels and larger than meadow mice. They are rarely, if ever, found away from rock slides or boulder piles. Their small size, bobtails, rounded ears, padded feet, and ventriloquistic alarm notes, "yink, yink," are all good field characters.

DISTRIBUTION.—Pikas are rock dwellers and are most abundant just above timber line. They should be looked for only in the vicinity of rock slides and boulder piles since they do not venture far out on the open tundra. Pikas occur in the mountainous regions of western North America from New Mexico to Alaska.

HABITS.—We observed pikas breeding late in May and on June 6 a pregnant female containing four embryos, each half an inch in length was collected. The young are born in sheltered nests deep beneath the rocks and, although we looked for them carefully, we did not discover any young pikas running about until after July 8 when the young were more than half grown. On July 28, near the Savage River bridge, we found young conies or pikas were active by 8 o'clock in the morning. By this date the young were almost as large as their parents. However, the youngsters could be easily determined by their clear gray color while the adults at this season were tinged with brown about the head and neck.

The outstanding character of the pika is its provident nature. Unlike the larger and more powerful mammals, this wee sprite takes thought for the morrow. Instead of spending a large portion of the warm summer in deep sleep and in sunning itself, as do the fat, lazy marmots, the pika literally "makes hay while the sun shines." As soon as the vegetation begins to mature in the late summer the pika starts to harvest his "hay"

Figure 62.—THE COLLARED PIKA LIVES IN ROCK PILES AND HAS SMALL ROUND EARS, SHORT LEGS, A CHUNKY BODY, AND A "BOBBED" TAIL.
Photograph taken May 20, 1926, Savage River. *M. V. Z. No. 5065.*

crop. Grass, sedges, and even heather plants are skillfully nipped off by the pika's sharp little teeth. As soon as the plants are cut the pika gathers them together in a bundle and then transports them by holding them crosswise in his mouth. The freshly cut "hay" is stacked under sheltering rocks where ventilation is good and where the cut plants remain until they are entirely cured. No farmer selects and harvests his hay crop more carefully than does the pika his crop. The pika's hay-making goes on until the frost blackens the vegetation and then, when the snowstorms of winter cover the landscape with a deep white blanket, the pika sits comfortably at home beside his well earned hay pile beneath a solid roof which is part of a whole snow-blanketed rock slide. He does not have to dig through the snow to get down to a food supply, as do the caribou and Dall sheep; he does not have to gnaw the bark of the stunted Arctic willows that stick up through the snow, as do the snowshoe rabbits; nor does our pika have to face cold trips across the open snow with the attendant danger of being pounced upon by some hungry hawk, owl, or red fox. Instead, by having forethought and providing a food supply for winter, he is able to run about and remain active all through the cold season of the year by traveling the underground passage ways and crevices between the broken rocks which form his home. He does not lie curled up stiffly in a frozen, almost death-like furry ball in a narrow underground cell, as do his cousins the ground squirrels and the marmots. His body is kept warm by a thick gray fur overcoat and his feet are incased in warm fur slippers which are noiseless and which never slip as he hops about the frozen rocks in going from his precious hay piles to his warm nest hidden beneath the rocks where even the powerful wolverine cannot dig him out.

On the morning of December 26, 1907, when the temperature was 31° below zero, Charles Sheldon found the pikas to be extremely active. They were calling to each other from various points on the moraine below Peter's Glacier at the north base of Mount McKinley.

In the spring, when the snow begins to melt and the first bare ground appears, the pikas venture forth in search of fresh food. Conies or pikas are early risers, being most active from 4:30 to 9 in the morning. On May 20 on a warm south-facing rock slide high up on the mountain near the main camp on Savage River, I watched a cony at a distance of 10 feet as he nibbled at a bit of heather. The little rascal put his left front foot on a sprig of the plant and while thus holding it down nipped off the leaves. The characteristic white collar which gives the pika its scientific name "*collaris*", was plainly visible. As I watched, the shadow of a soaring golden eagle flashed across the rocks where the pika was feeding. The

pika disappeared instantly, but in less than 3 minutes curiosity overcame fear and the little gray sprite crept out from his hiding place in a crack between two rocks. He stole forward with ears raised, eyes shining, and nose twitching, trying to discover the cause of the disturbance (fig. 62).

On June 16, 1932, I visited the identical rock slide where I had found and photographed a pika on May 20, 1926. An individual of this species, possibly a descendant of the one which I had seen in 1926, was found following the identical runways among the rocks which the original pika had followed. On June 12, 1932, at Double Mountain, I found a pika living in a crevice at the base of a cliff just beneath a golden eagle's nest containing two downy eaglets. There appeared to be no conflict between the eagle and the pika and it seemed probable that the association had been one of several years standing for both the eagle's nest and the pika's den indicated that they had seen many years of service.

The pika population in Mount McKinley National Park is remarkably stable. Investigation has shown that approximately the same number of individuals are to be found in certain given rock slides year after year. A stranger might have difficulty in finding the pikas, but once their chosen habitat among the rocks is found they are easily relocated.

MACKENZIE VARYING HARE

Lepus americanus macfarlani [MERRIAM]

GENERAL APPEARANCE.—In size and general appearance varying hares are about halfway between a cottontail and the common jack rabbit. The ears are longer than those of a cottontail but not as long or as large as those of a jack rabbit. The hind feet of the varying hare are so large that the animal is often called snowshoe rabbit. In winter the pelage of this hare is pure white, but in summer it changes to brown. Length, 18 inches; tail 1.5 inches; hind foot, 5 inches; ear from crown, 3.5 inches.

IDENTIFICATION.—In June when visitors begin to arrive at McKinley Park these hares are in their brown summer coats although small patches of white, remnants of their winter coats, may still be visible here and there even as late as midsummer (fig. 63). The large elongated tracks which they leave in the snow are characteristic of these hares, as are also the flattened pill-like droppings.

DISTRIBUTION.—Mackenzie varying hares are found from Cook Inlet and the base of the Alaska Peninsula east to western Mackenzie, northern British Columbia, and northwestern Alberta. In Mount McKinley National Park during "rabbit years" these mammals are found throughout

Figure 63.—A MACKENZIE VARYING HARE IN THE SHORT-HAIRED BROWN SUMMER COAT, BUT WITH PATCHES OF THE WHITE WINTER COAT STILL ADHERING TO SIDES AND FLANKS. THE WHITE WILLOW LIMBS IN THE BACKGROUND HAD BEEN STRIPPED OF THEIR BARK BY HUNGRY HARES THE PREVIOUS WINTER.
Photograph taken June 3, 1926, Savage River. *M. V. Z. No. 5008.*

the timbered portions of the park as well as in willow thickets above and below timber line.

HABITS.—When we arrived at our Savage River camp on May 19, 1926, we found varying hares to be abundant in the black spruce woods nearby. Rangers living in the park told us that the "peak" abundance of snowshoe rabbits had been reached in 1925 and that they had been increasingly abundant for three seasons. The period of maximum abundance of the varying hare usually occurs every 10 or 11 years.

During the winter of 1925 acres of willow thickets had been stripped of bark as high up as the hares could reach. On May 22, 1926, I found and photographed the top of a black spruce tree which had been blown down by severe winter winds. It had then been stripped of all the green needles and much of the bark by the hungry rabbits (fig. 8).

Residents told us that the hares which had been pure white all winter first began to acquire their brown summer pelage about the 20th of April.

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On May 26, 1926, I collected an adult male hare. The sides and both the front and hind feet of the specimen were still white. However, by this date most of the hares were in their brown summer coats, although their feet and the outer margins of their ears were still white (fig. 63). On June 10 I shot a "pinto" hare. Its brown pelage still showed several white patches which were about 1 by 1½ inches in size. This hare contained four embryos each three-fourths of an inch long. On the same day another female hare was shot. It contained three well developed foeti each 4 inches long and almost ready for birth.

A careful search through the rabbit areas was made on July 25, 1926, and we were surprised to find that the hares were not as numerous as they had been 2 months previous. Although we searched carefully we were unable to find a single living young hare. In fact we saw only three young hares all summer. The hares had bred but apparently reproduction had been faulty. Also, some of the old hares were dying of "rabbit" disease, possibly *Tularemia*.

Varying hares have many enemies to elude. Among mammals the chief enemies of the Mackenzie varying hares are Canada lynx and Kenai red foxes. Perhaps as many, or more, hares are captured by the Kenai red fox than are captured by any other of the Mackenzie varying hare's natural enemies. Among the birds, the Saint Michael horned owls and the American hawk owls are their worst enemies.

When I visited Mount McKinley National Park in 1932, I found varying hares to be at their periodic minimum. In fact, although I looked for them in suitable localities I did not succeed in finding a single one during the entire summer and was told that only one had been seen in the region throughout all of the previous winter. The last peak of abundance was in 1925.

ALASKA MOOSE

Alces gigas [MILLER]

GENERAL APPEARANCE.—The moose is the largest member of the deer family and the Alaska species is the largest of all the moose. The bull moose has wide-spreading, heavy, palmated antlers which are grown and shed each year; the females lack these appendages. Moose of both sexes have long legs and chunky bodies. The height of the animal at the shoulders is greater than is the height at the rump. This, combined with the broad muzzle and the pendulous growth of skin and long hair hanging from the throat, gives the moose a grotesque appearance. The general color of the Alaska moose is dark brown. The coat of the calf is a rich

reddish-brown, and it is not spotted as is the coat of the young deer. Length 108 inches; tail, 2.5 inches; hind foot, 31 inches.

IDENTIFICATION.—The high shoulders, large size, dark coloration—in the field these animals often appear to be almost black—"hooked" nose and pendant strip of skin, called a "bell", which hangs from the throat, are all good field characters of the moose. The tracks of this animal are like gigantic deer tracks. They are broad at the base and taper to a sharp point at the toe; they are not rounded and cowlike as are the tracks of the caribou.

DISTRIBUTION.—Moose were formerly found in timbered areas over most of the northern half of North America. During the summer in Mount McKinley National Park moose are usually found in or along the margin of the spruce timber. They may be found at times in the willow thickets or even in the higher passes while traveling from one forested area to another. They seek the willow thickets above timber in order to escape the swarms of mosquitoes and moose flies which are more numerous in the lowlands. These insect pests directly affect the local distribution of both caribou and moose.

HABITS.—On the divide at the head of Caribou Creek, July 9, 1926, we encountered a cow moose with her calf in a dense thicket of willows that averaged 5 feet in height. On May 25, 1932, Chief Ranger Louis Corbly found a cow moose with her newly born calf which was so young that it was not yet able to walk. The parent moose, having a strong maternal instinct, chased the man away. When on foot Corbly attempted to make a close inspection of the moose's calf. Fortunately for the ranger, however, his saddled horse stood nearby and he was able to escape the attack made by the infuriated cow moose. I experienced a similar surprise attack by a moose. She undertook to defend her recently born calf near Telegraph Creek in British Columbia. One cannot be too cautious in approaching the new born young of any species, but visitors to Mount McKinley National Park should be especially careful in approaching young moose or any cow moose with young.

On July 22, 1926, at Double Mountain we watched a cow moose crossing a high mountain pass. She traveled at a slashing trot and covered a mile in 10 minutes. Her gait was normal and undisturbed, for we were sitting quietly and she did not see us.

During the summer of 1932, at a small lake near the mouth of Igloo Creek, a cow moose and her twin calves were observed many times. This moose became so accustomed to automobiles passing on the highway that she paid little attention to them, even though the cars often stopped long

enough to secure photographs. However, she was quite shy when approached by a man on foot. Tracks along the muddy margins of the lake and cropped-leaf plants showed that this mother moose was in the habit of feeding upon the aquatic vegetation which grew in the shallow lake.

In Mount McKinley National Park the antlers of the bull moose begin to branch by the first of June. A bull moose killed by Charles Sheldon on July 29, 1906, at the north base of Denali had antlers which were about grown but still in the velvet. They had a spread of 67 inches. If these antlers had been allowed to mature the moose doubtless would have carried a record head. By the first of September the velvet covering of antlers is rubbed off and the antlers are grown and hardened. The bull cleans and polishes his antlers by rubbing them against the brush and the hard bark of trees. By the last of September the rutting season is at its height. On December 19, 1907, near Peters Glacier, Charles Sheldon killed a bull moose that had already shed his antlers. This was unusual, for the antlers are not dropped ordinarily until after Christmas.

Sheldon states that during the summer the moose eat considerable green grass and buds of willows. During the winter he found them feeding exclusively on willows.

Moose are excellent swimmers. Charles Sheldon witnessed a cow and her calf swim across a lake at Cathedral Mountain on September 8, 1907.

In winter moose are prone to make a network of beaten trails in the snow, usually in timber near a suitable food supply. This "yarding" gives them a chance to move about freely and to obtain food. It also gives them a better opportunity to protect themselves against the attack of wolves. However, when the snowfall is excessive, as it was in the winter and spring of 1932, many of the moose leave the lowlands and seek the higher wind-blown ridges where there is less snow. At such times, in traveling through the crusted snow the skin on the legs of the moose is often cut through and the animal leaves a bloody trail behind him. One of the McKinley rangers reported a narrow escape which he had when he suddenly came upon a moose. This animal was plowing through the deep crusted snow. The moose, feeling cornered, evidently considered the man's approach an attack; he charged at the ranger, who was on snowshoes, and the man was barely able to escape.

Moose are increasing and are now quite common in Mount McKinley National Park.

STONE'S CARIBOU

Rangifer arcticus stonei [ALLEN]

GENERAL APPEARANCE.—With the exception of the Alaska moose, the caribou is the largest member of the deer family found within the park. In Alaska everyone refers to the males as "bulls"; to the females as "cows"; and to the young as "calves." An average sized caribou bull stands 50 inches in height at the shoulders and weighs, when in fair flesh, more than 300 pounds. They have longer legs but are not so chunky as are the mountain sheep. In the late fall the bulls are usually dark brown, often having a white mantle that covers the neck and shoulders. During the winter this white area often extends back along the sides giving the appearance of a broad white patch. Caribou are the only members of the deer family in which both the males and females bear antlers. The antlers of the caribou are shed annually. These antlers are large, wide-spreading and have numerous points (fig. 64), some of which are much flattened, especially the large brow tines or shovels which extend well forward over the nose. The ears of the caribou are of medium size, dark colored, and well covered with fur. The tail is short and thickly covered with hair; it is brown above and white beneath. The hoofs are dark brown, rounded, and cowlike, but are more flexible and better adapted to pawing in snow.

Length, 84 inches; tail, 6 inches; hind foot, 24 inches.

IDENTIFICATION.—In the field in summer the caribou may be distinguished at a distance from their usual associates, the mountain sheep, by the fact that they are dark colored while the sheep appear entirely white. When close at hand, the large upright many-branched antlers serve to identify these animals. Caribou have a characteristic way of running together into a compact band when alarmed (fig. 65). On scenting danger the tail is raised, the white under portion serving as an effective danger signal to the remainder of the herd. When alarmed the animals dash off with a comical leap and a characteristic stiff-legged gallop.

DISTRIBUTION.—Caribou range over most of the barren ground or tundra regions along the Arctic coast of North America. They are common in Mount McKinley Park and are found in summer chiefly on the rolling tundra and along the higher grass-covered ridges above timber line (fig. 66). The head of Savage River, Double Mountain, and Sable and Highway Passes are localities where caribou may be found in numbers during the summer season. However, these animals are of a roving disposition and while hundreds may be present in a locality one day, they may be gone the next day.

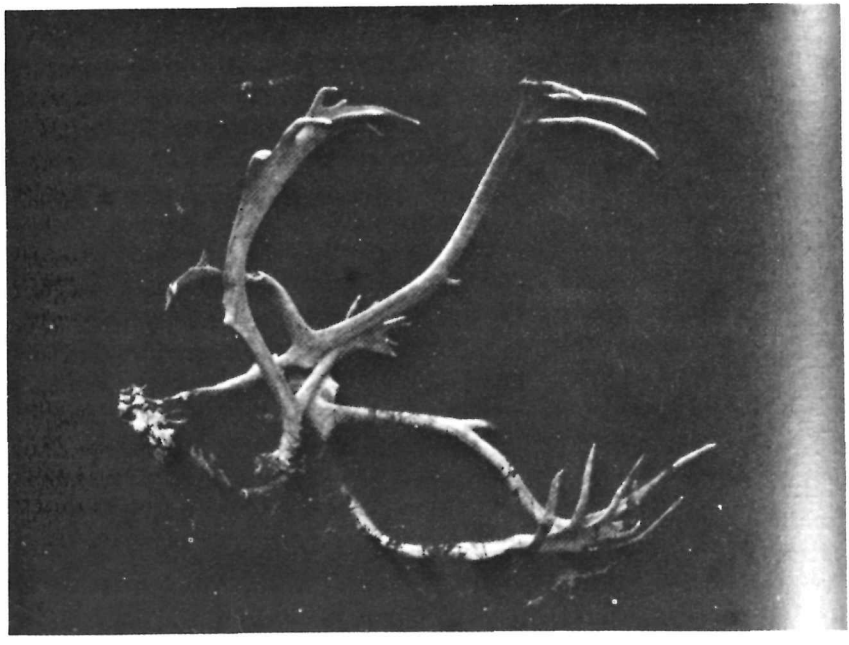

Figure 64.—ANTLERS OF TWO FIGHTING STONE'S CARIBOU BULLS WHICH BECAME INTERLOCKED WITH FATAL RESULTS.
Photograph taken July 16, 1926, Sanctuary River. *J. S. D. No. 2*

HABITS.—The caribou is a Stone Age animal. The stone carvings which have come down to us as the very earliest graphic record of man in Europe depict the caribou in its characteristic and unmistakable form. So far as we have been able to see, there has been no change in the general appearance of the animal during thousands of years.

There is considerable seasonal and daily movement of caribou in the McKinley region. During the annual rutting season in the fall, there is evidence that the caribou near the north base of Mount McKinley band together in herds, as many as three or four thousand being observed in one aggregation, and travel in a general northerly direction. The herds circle about, but finally reach their wintering grounds along the lower foothills and plains well outside the mountains along the northern boundary of the park. They drift eastward during the winter and reenter the park along the Teklanika and Sanctuary Rivers the following spring. Caribou were noted returning westward in the park on May 19, 1926. On this

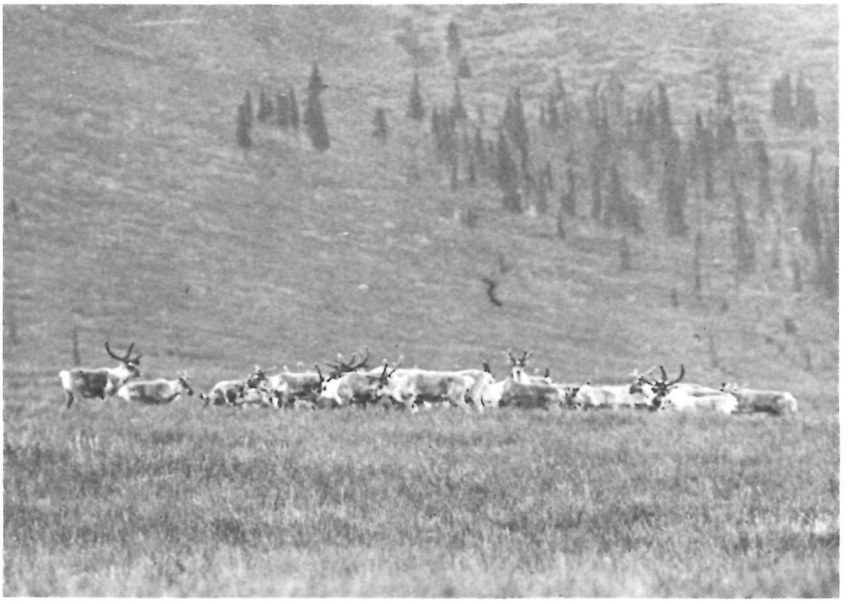

Figure 65.—A BAND OF STONE'S CARIBOU, SCENTING DANGER.
Photograph taken June 3, 1926, Savage River. M. V. Z. No. 4952.

date seven caribou were observed traveling along a ridge near Jenny Creek. They seldom stopped to feed but maintained an average speed of 3 miles per hour and were obviously in transit, traveling to their high summer range (fig. 66).

Caribou may be encountered singly or in herds of several thousands. Ordinarily during the summer small bands of from 30 to several hundred individuals are met with most frequently. On July 9, 1926, at Double Mountain, on the divide between the Sanctuary and Teklanika Rivers, we counted more than 200 caribou that were scattered about through the pass and well up on the mountain slopes. At Sable Pass on the day following we found evidence, tracks, and trampled herbage, that an immense herd of caribou, estimated at 5,000, had passed through that region 3 or 4 days previously. However, the herd had traveled on and we saw only half a dozen stragglers. On July 19, at McKinley Bar, we encountered a band of 12 caribou cows and 8 calves. At the head of Savage River on June 28 we found a herd of 53 caribou feeding in a meadow about 100 acres in extent. There were about an equal number of each sex in this

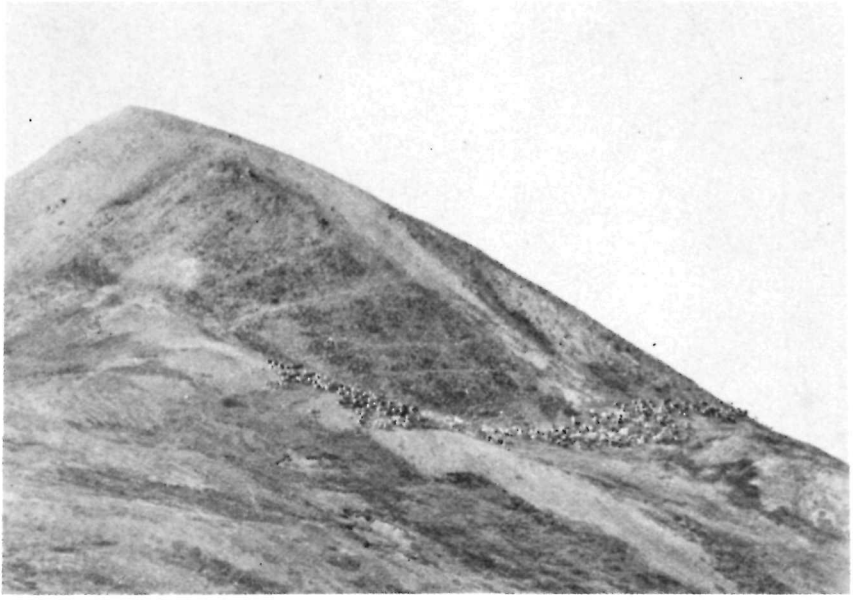

Figure 66.—A GROUP OF ABOUT 500 STONE'S CARIBOU ON SUMMER RANGE. NOTE OLD CARIBOU TRAILS ABOVE THE HERD.
Photograph taken July 10, 1932, East Fork. *W. L. D. No. 2664.*

herd and a good many calves. Single individuals or small bands of 3 or 4 were encountered almost daily during our stay in the park. At Igloo Creek on July 21, 1932, a band of caribou consisting of 347 individuals, by actual count, was observed.

In summer the caribou occupy the open tundra and higher grassy slopes. We found that there was a general tendency to follow the fresh new vegetation up the mountain slopes as the season advanced. Visits to the head of Savage River and to Highway Pass during June and July revealed from one to several herds of caribou standing or bedded down on the snowbanks (fig. 67) to escape the attacks of flies and mosquitoes. These two localities and Sable Pass are among the best and most accessible places for park visitors to see, study, and enjoy caribou.

The eyesight of caribou during the summer is anything but keen. We took occasion to prove this fact many times. On May 20, 1932, while climbing a steep hillside near the Savage River bridge, we sat down on a bare rock slide to rest. Looking up we beheld a band of migrating caribou approaching. They were headed straight for us. We knew that

we were within a few feet of the regular caribou trail but we remained quietly seated in order to see how close they would come. When the main band had approached within 40 yards, they stopped and began to graze. The old bull caribou which was leading the band came straight on toward us and passed quietly within 10 feet of our resting place on the open hillside. The wind had been blowing directly from the feeding animals and in our direction, but as soon as the old bull leader reached a point behind us he got our scent and nearly exploded in his frightened attempt to escape the previously unobserved danger. Upon seeing their leader excited, the whole band turned and bolted up the hill. They plunged into the snowdrifts, their legs sinking in the soft snow clear up to their bodies.

Again, on June 28, 1926, I crawled along a bare, open, rocky slope to within a hundred yards of a band of caribou without being detected. Then I slid slowly down the steep slope, keeping close to the ground, until I approached to within 30 yards of two large bull caribou that were lying in the open in plain sight. These two bulls did not pay the slightest attention to me as long as I made no violent motions and remained crouched on the ground. At various times during the summer we found that if the

Figure 67.—STONE'S CARIBOU REGULARLY RESORT TO SNOWBANKS TO ESCAPE ATTACKS OF MOSQUITOES AND FLIES. *Photograph taken July 8, 1932, Stony Creek. W. L. D. No. 2656.*

wind were favorable it was possible, by lying down on the ground, to slide downhill slowly into the very midst of a band of grazing caribou.

Investigation has shown that the caribou's sense of smell is as good as its eyesight is poor. On one occasion, a cow caribou winded us while we were yet over a half-mile distant. At another time a band of caribou caught our scent, borne to them by a favorable wind, nearly a mile from where we stood. The following incident is indicative of this animal's keen sense of smell. On June 27, at the head of Savage River, we crawled up a bare, gravel slope in an endeavor to get close to a band of caribou. Some time later, the same band crossed our trail which was then almost an hour old. The moment they caught the human scent of our tracks 8 out of the 12 suddenly stopped and started back.

On another occasion a band of about 40 caribou came down off the hill and grazed along a bench above the river. Taking the camera and keeping to the windward of the caribou I crawled up behind a row of dwarf willows close to the animals. They were about 200 yards distant and were grazing directly toward me, the wind being from them. Some of the old bulls had beams 30 inches long and although nearly grown the heavy antlers were still in the velvet. The animals grazed up to within 100 yards of me then turned back, and lying down, began to chew their cuds. Soon it started to rain and the wind shifted. It carried a light breeze from me toward the caribou and within 10 seconds, the whole herd was on its feet (fig. 65). They threw their heads up in order to catch any scent that might be carried by the air currents. Observation with binoculars showed that their nostrils dilated as they sniffed the air suspiciously. One more whiff and they were off, circling around above me they galloped downward in a close-packed herd. I remained hidden all this time behind the willows so that they could not see me. It was a clear case of their ability to detect human presence through the acuteness of their sense of smell.

Caribou are as keen to scent danger as mountain sheep are to see it. It is interesting that the caribou roaming over the relatively flat country should have developed a wonderful sense of smell and that the mountain sheep inhabiting the rocky areas should have developed extremely keen sight. It is true that the continual winds of the level or rolling tundra are almost sure to bring the scent of an enemy to the caribou, while the broken air currents of the rugged mountainous country that the sheep inhabit are less dependable. Because of the nature of the topography and of their vantage points at high elevation, the sheep have evidently learned to depend on their eyesight to warn them of danger.

Figure 68.—FOUR OLD MALE STONE'S CARIBOU FEEDING ON AN OPEN HILLSIDE. *Photograph taken June 28, 1926, head of Savage River.* *M. V. Z. No. 4970.*

It was our experience that the female caribou were much more alert and much quicker to detect the presence of danger than were the males. This fact was impressed upon our minds many times during the summer. Invariably, when we crawled up to a band of caribou, it was the females and especially the females with young who first detected our presence. For example, on June 28 we crawled up towards a herd of caribou. When we got within 60 yards of a cow and calf she saw us and, apparently being fearful for her calf, moved off. A large, dark-colored bull caribou was lying down contentedly chewing his cud. When we approached to within 40 yards of him a cow that was with the bull saw us and began to edge away. After the cow had left I crawled down to within 30 yards of four old bulls that were drowsily feeding out in the open (fig. 68). Many times in Alaska I have observed that the leader of a band of caribou is usually some old female (fig. 69).

Aside from heavy breathing and snorting, the caribou utter a peculiar grunt which reminds one of the muffled barking of a small dog. The calves when separated from their mothers utter a series of these sounds. Though muffled, on a calm day, these sounds will carry for a quarter of a mile.

Figure 69.—AN OLD FEMALE LED THE HERD OF STONE'S CARIBOU. NOTE COW WITH SMALL CALF AT RIGHT.
Photograph taken June 27, 1926, head of Savage River. *M. V. Z. No. 4963.*

Even when separated from her calf, a mother caribou will make no effort to warn it or to coax it back by any audible call.

Tracks of a large bull caribou made in the sand measured 5 inches in width. Other tracks made in firm wet soil (fig. 70) were also 5 inches in width. From measurements taken of tracks made by a number of large males we found they were all about the same size. Tracks of female caribou were found to vary from 4 to 4½ inches in width, being approximately as long as they were wide. In both sexes the tracks are very much like cow tracks in outline (fig. 70).

When undisturbed, caribou often travel in single file (fig. 71). Trails thus formed are a conspicuous feature of the landscape. They average about 14 to 18 inches in width, and in some places the soil has been cut down to a depth of as much as 2 feet by the recurrent travel of generations of caribou. On the soft, springy tundra trails are usually mere depressions from 4 to 6 inches in depth.

The droppings of caribou are similar to those of deer, except that they are much larger, longer, and somewhat more pointed.

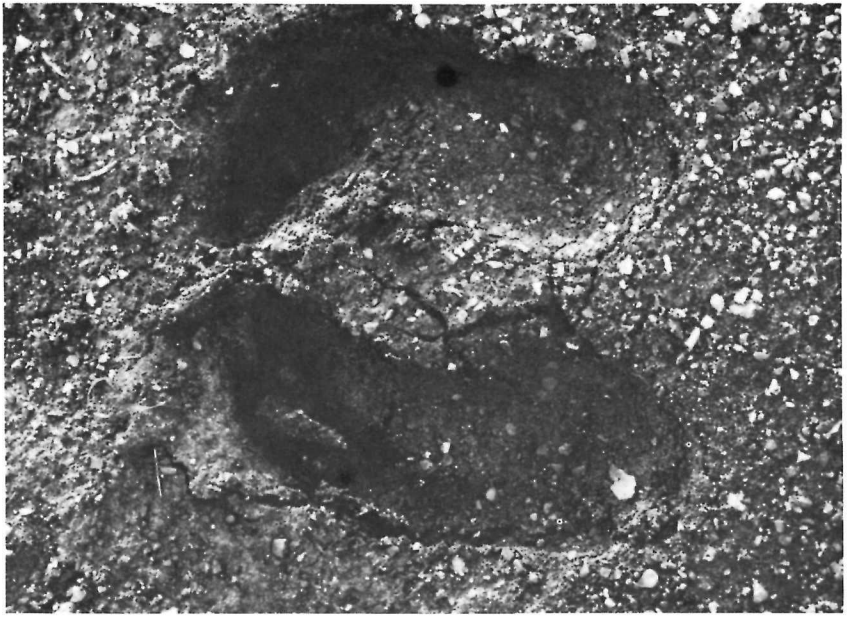

Figure 70.—THIS TYPICAL TRACK OF A MATURE MALE STONE'S CARIBOU WAS LIKE A COW TRACK IN OUTLINE AND MEASURED 5 INCHES IN WIDTH.
Photograph taken June 30, 1926, Savage River. *M. V. Z. No. 4955.*

Caribou are prone to visit mineral springs or "licks" during the summer. On the trail between Double Mountain and Igloo Creek there is a well-established mineral spring which is visited by large numbers of caribou during the summer. Here we found a muddy area nearly 100 feet square that had been trampled bare of all vegetation by the caribou. We found that a few of these animals visited the lick at the head of Ewe Creek; however, this particular spring was visited especially by mountain sheep.

The spring molt in males was much in evidence by June 27. By that date the caribou's pelage had become ragged, the dark new summer pelage showing through the old, faded, winter coat in large patches, particularly about the head and shoulders. At this time the cows were in somewhat better pelage than were their mates, the old hair being more "shed out." The new hair continues to grow until by late fall the pelage consists of long, coarse, brown and whitish hairs which are longer and harsher than were those of the short, soft, brown summer coat.

We had been accustomed to think of caribou as living almost, or entirely, on reindeer or caribou moss and lichens (fig. 72) and were therefore sur-

prised to find that during the summer the caribou lived to a considerable extent on succulent green vegetation, such as *Boykinia* (fig. 73), and on browse. Although we watched them at close range for many hours, we did not at any time during June and July see them feeding on reindeer moss which could easily have been obtained. In grazing they were found to eat most of the available green vegetation. A number of them were observed to browse extensively on green willows. This had been observed also by Charles Sheldon who found the stomach contents of two caribou, shot by him on November 23, 1907, to contain willow buds.

On July 10, 1926, at Double Mountain, we observed a band of caribou feeding. By 9 o'clock in the evening most of the caribou had eaten their fill and were lying down chewing their cuds. There was a chill wind blowing through the pass which gave them relief from the flies and mosquitoes. The mountain sheep feed less hurriedly and were still grazing assiduously at 10 o'clock in the evening. As has been stated, caribou are often found in close association with mountain sheep. We frequently found the two species grazing side by side within 10 feet of each other without the least show of animosity, although there must be considerable competition at times for food.

Figure 71.—THAT STONE'S CARIBOU SOMETIMES TRAVEL SINGLY IS INDICATED BY THESE INDIVIDUAL TRACKS IN DEEP SNOW. *Photograph taken May 29, 1932, Jenny Creek. W. L. D. No. 2977.*

On July 22, a large moose was observed as it traveled hurriedly along a caribou trail in the pass at Double Mountain. However, the animal did not pause to feed until it was well down the slope and near timber. Twice during the summer we found reindeer, or hybrids between reindeer and caribou, mingling with the wild caribou in the park. Thus, on May 23, 1926, in Savage River Canyon, there was one small

spotted reindeer in a band of 26 caribou. It had escaped apparently from a neighboring herd and had joined the caribou. Again, on June 27, at the head of Savage River, a spotted animal was closely observed which had every appearance of being a cross between a reindeer and a caribou. He was too large to have been a full-blooded reindeer. Several reindeer "escapes" have been known to run with caribou in the park. The Superintendent of Mount McKinley National Park told us that in order to keep the native caribou stock pure the rangers had been instructed to shoot such stray or feral reindeer whenever they were seen within the park area.

By the time we arrived in the park on May 19, the antlers of the male caribou had reached a length of several inches. There was, however, considerable variation in antler development. Although the antlers of the bulls were nearly grown by June 27, on this same date it was observed that the antlers of cows accompanied by small calves were only 4 inches long and that they were much smaller than those of the cows without calves. In general, the antlers of the female develop later in the season than do the antlers of the male, and there is a corresponding difference in the time of shedding. On November 23, 1907, Charles Sheldon killed a bull caribou that had just shed its antlers. The pedicels were still bloody. This was unusual, for ordinarily the bulls do not shed their antlers at such an early date. It has been claimed that the late shedding of antlers in the female is due to her greater need of protection for herself and her young. None of the female antlers which we saw were as large as those of an average bull's. However, on November 24, 1907, Charles

Figure 72.—CARIBOU MOSS AND ALPINE WILLOW (HERE SHOWN NATURAL SIZE) ARE EXTENSIVELY UTILIZED AS FOOD BY STONE'S CARIBOU IN THE FALL. *Photograph taken June 17, 1926, Savage River. M. V. Z. No. 4992.*

Sheldon killed a large caribou cow that had antlers which measured 51 inches in length.

From early June until about the first of September the bulls remain up near the source of the rivers in the main range, feeding on grass and other plants during the day and resting at night. About the first of September most of the bull caribou leave the high country and go north, down to the adjacent treeless country where they herd the cows. Since the species is polygamous there are many combats among the rival bulls. The rut or breeding season begins in September and by September 20 most of the old bulls have swollen necks and a strong musky odor which is characteristic of the breeding male.

Only one calf is born per cow during a season. We saw no instance of twins. By actual count, only about half of the females were found to have calves by the last of June. On July 21, 1932, at Igloo Creek I counted a band of 63 caribou which consisted of 40 cows, 20 calves, and 3 young bulls. In some instances the calves may have died, but every indication seemed to lead to the conclusion that possibly not more than two-thirds of the females bear young each season. The calves are dropped during the latter part of May. The first one which we saw was found on May 28, 1926. This calf was obviously only a day or two old. It was barely able to walk and could not stand on its wobbly legs for any length of time. The calves at birth are not spotted, as are the young of most of the deer family. The young of this species are lighter in color than are the adults. In general appearance, a month-old caribou calf is very similar in color, size, and contour,

Figure 73.—Boykinia richardsonii GRAY, ONE OF THE SUCCULENT HERBS THAT FORM THE MAJOR PART OF THE CARIBOU'S FOOD IN SUMMER. *Photograph taken July 14, 1926, north base of Mount McKinley.*
M. V. Z. No. 4991.

to the calf of an ordinary Jersey cow. Caribou calves appear to have little affection or attachment for their mothers and often wander aimlessly about. It was no uncommon sight to see a mother caribou following, instead of leading, her calf. On one occasion we watched a lone calf that was rushing up and down hill and over ridges in a seemingly senseless fashion. At length he ceased running, lay down on a mossy knoll, and went to sleep. The young caribou develop slowly. The yearlings are not more than half the size of a full-grown cow. A newly born mountain sheep keeps close within the protection of cliffs and does not stray far from its mother. In marked contrast to this, the young caribou wanders far from home and seemingly depends upon its mother to hunt it up. Charles Sheldon has pointed out that the cows constantly lose their young and run about excitedly trying to find them. It is not improbable that the infant mortality is much higher in the case of caribou than it is in mountain sheep.

During the rut it is not unusual to find clumps of willows or lone spruce saplings which have been defoliated, or even broken down, by the males rubbing their antlers against the branches in order to remove the velvet. The caribou bulls are known to fight viciously among themselves, particularly at the beginning of the rutting season. On July 16, 1926, near the Sanctuary River, we found the white, bleached bones and interlocked antlers of two large bulls that had succumbed in a battle for supremacy. Their antlers had become so locked in fighting that the animals had been unable to free themselves and had died of exhaustion and starvation. Judging from the antlers, this fight had transpired some time during the previous fall. Pieces of hide were still in evidence about the carcasses. One set of antlers had a spread of 41 inches and the other nearly 44 inches. The height above the skull of the larger antlers was 43 inches. The horns were locked in three places (fig. 64), and although two men pulled as hard as they could they were unable to separate the two heads. Foxes and magpies had fed on the carcasses of the fallen monarchs, as was evinced by numerous droppings near the bones. The skeletons showed they had fought so viciously that the shoulder blade of one bull had been punctured by the tine, or sharp tip, of the other's horns.

The large timber wolves follow the caribou bands and exact a daily toll. However, the wolves tend to weed out the weaklings. This practice of the wolves is one of nature's methods of keeping the caribou herds physically fit. It is a natural process and has existed for thousands of years.

The introduction of domestic reindeer offers serious complications to the

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welfare of the native caribou, both through the introduction of disease and through breeding of the strong native caribou with the weaker and smaller domestic reindeer. The crossing of the inferior reindeer with the caribou endangers the perpetuation not only of the caribou in Mount McKinley Park but the magnificent herds throughout interior Alaska. Where the two animals occupy the same range, the caribou is doomed to disappear and the resulting population will be a mongrel mixture. Since reindeer and caribou cannot exist together, it would be wise to restrict the territory occupied by the reindeer in such a way that the caribou may be preserved.

Owing to the transient nature of the species it is exceedingly difficult to get any satisfactory count or census of the entire caribou population. However, by going over certain typical sections of their range and by making careful counts in 1926 and again on the same areas in 1932, we feel confident that there has been no serious loss in the total caribou population of the park during that time.

DALL SHEEP

Ovis dalli dalli [NELSON]

GENERAL APPEARANCE.—The Dall sheep is somewhat smaller than the Rocky Mountain bighorn of the United States. A fair-sized ram of the Dall sheep stands about 39 inches at the shoulders and weighs more than 200 pounds. The older rams have large, much curled horns (frontispiece). Young rams and female sheep have short, slightly curved goatlike horns (fig. 74). The female is about two-thirds the size of the ram. At a distance young rams are difficult to distinguish from the females. The ears of the Dall sheep are short, round, and well covered with hair (fig. 74). The tail is small and inconspicuous, being only about 4 inches long. Total length, 58 inches; tail, 4 inches; hind foot, 16.6 inches.

IDENTIFICATION.—Two important diagnostic characters of the Dall sheep are the white color and, in the rams, the relatively slender, wide-spreading horns (fig. 75). Contrasted with the Dall sheep, the Rocky Mountain bighorn of the United States is sandy-brown in color; its horns are large at the base and are closely curled and they do not extend out on either side of the head to so great a distance. Tracks of the Dall sheep show straight-sided-hoof marks which are well separated anteriorly (fig. 76) and are only half as large as are the tracks of caribou.

DISTRIBUTION.—Dall sheep are found in the mountains of central and

northern Alaska and the Yukon Territory. They are numerous throughout the park on the *north* side of the main Alaska Range. The reason for this is that the snowfall is so heavy on the south side of the range that it would be difficult or impossible for the sheep to exist throughout the winter. Not only would their food be covered, but they would be so hampered in their movements by the heavy snowfall that they would be in grave danger from natural enemies. However, on the north slope the snowfall is relatively light and many ridges are swept bare of snow by the winter winds. This means that on the steep mountain slopes food is available during all seasons of the year and that the sheep are able to move about freely all winter and to thus escape their enemies.

HABITS.—During the entire period of our stay in the region in 1926, there was scarcely any time in the 24 hours each day that it was not possible to look out from our camp and count from 57 to as many as 104 Dall sheep on the surrounding hillsides within a mile of the camp.

In 1932, following the most severe winter in 40 years, I learned that the unusually heavy snowfall had caused many mountain sheep to die, presumably through lack of available food. Both mountain sheep and caribou, because of their disadvantage in deep snow, are said to have been killed by the timber wolves and coyotes. The apparently poor reproduction

Figure 74.—FEMALE DALL SHEEP, SHOWING SHORT, SLIGHTLY CURVED, GOATLIKE HORNS, AND HEAVY, PURE WHITE WINTER COAT. THE EWES ARE SOMETIMES INCORRECTLY CALLED "IBEX." *Photograph taken May 30, 1932, Savage Canyon. W. L. D. No. 2706.*

among the sheep in the spring of 1932 may have been due to the poor physical condition of the ewes.

In the Mount McKinley district the mountain sheep have distinct summer and winter ranges. The chief wintering ground is the north, or outside, range and adjacent foothills. The territory occupied by the sheep in winter varies in elevation from 1,000 to 5,000 feet. This winter range is characterized by a relatively light snowfall, 3 to 4 feet, and by the general ruggedness of the topography. In many cases the mountain slopes are so steep that the snow does not stick. Another reason for this region being favorable winter range for the sheep is the abundant growth of red-top and other grasses, found in sheltered nooks at the bottom of the lower rock-slides and cliffs in the area, often attaining a height of 3 feet during the summer. This grass matures and cures naturally so that a nutritious and accessible food supply is available even during the heaviest storms. The abundance of tracks and other "signs" found about these places and

Figure 75.—CHARACTERISTIC FEATURES OF THE MALE DALL SHEEP ARE THE RELATIVELY SLENDER WIDESPREADING HORNS.
Photograph taken June 1, 1932, Igloo Creek. *W. L. D. No. 2453.*

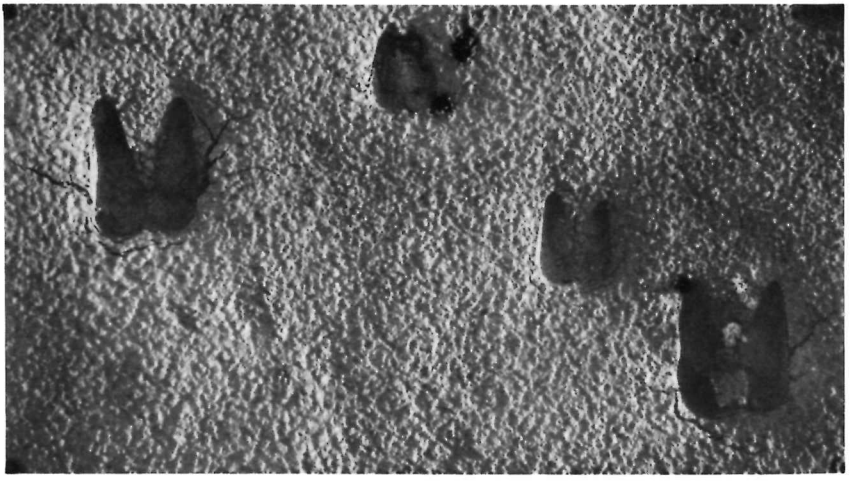

Figure 76.—TRACKS OF EWE AND LAMB (*Ovis dalli*). NOTE STRAIGHT-SIDED-HOOF-PRINTS AND ANTERIORLY SPREAD TOES.
Photograph taken June 7, 1926, Savage River. *M. V. Z. No. 5205.*

amid the alder thickets indicate that the sheep congregate in considerable numbers at such points during late winter and early spring. The sheep abandon the winter range usually during the first week in June and, crossing the low valleys, move southward to the higher summer pastures in the main Alaska Range. Here they obtain fresh forage throughout the summer following the springing vegetation upward along the snowline. Thus we find a very marked system of deferred grazing practiced by the Dall sheep. Their sojourn in the main Alaska Range during the summer gives the vegetation on the winter range an opportuinty to grow and mature. Incidentally, this system assures the sheep an adequate food supply during the stressful time of winter, when the main range is heavily blanketed with snow.

The head of Savage River, above the Caribou Camp, is a favorite summer home of several bands of mountain sheep. This is one of the most accessible and best places for park visitors to see not only mountain sheep but also caribou and even grizzly bears. Divide Mountain, between the Sanctuary and Savage Rivers on the old trail to Copper Mountain, is also an excellent place to find sheep, particularly in late summer (fig. 77). Those visitors who make the trip to the base of Mount McKinley have numerous opportunities to observe the Dall sheep at Sable Mountain, Toklat, and various

points en route. However, it was our experience that the opportunity to study sheep was even more favorable at Igloo Creek and Sable Mountain than it was nearer the base of Mount McKinley.

We witnessed several migrations of sheep from their winter range to their summer pasture. On June 15, 1926, a typical trek was observed at about 10 o'clock in the morning. We noted a flock of 64 mountain sheep working down from the north range into the valley near the transportation company's main camp on Jenny Creek. The sheep grazed down the hill, keeping in a compact body in the open away from the spruce timber. At a distance they looked like a large moving mass of snow spreading out over the brown tundra. After considerable hesitation the band, led by an old female, made a dash across the willow bottom land to a nearby gravel ridge on the opposite side of the valley. The flock traveled in single file as they went through the willow thickets which dotted the stream bed. Each animal marched along with military precision until their River Jordan had been crossed. Upon reaching elevated hard ground on the other side the flock broke rank and scampered off wildly along the ridge into the foothills of the nearby main Alaska Range. Groups of old rams often linger for several days on the winter range after the ewes and lambs have left.

One reason for the sheep wintering in the more rugged portions of the north range is doubtless because in such places suitable protection is secured for the young lambs at birth. Thus we found that certain south-facing, rugged cliffs in Savage River Canyon were regularly selected as lambing grounds. The presence there of numerous small potholes and caves at the bases of perpendicular or even overhanging cliffs (fig. 78) gave abundant protection to the newly born lambs and to their mothers. Tracks of wolverines and observed attempts of golden eagles to capture the young lambs proved the value of such hiding places, particularly while the lambs were small. As a matter of fact, observations showed us that the young lambs would not normally venture more than 50 or 100 yards from such havens of refuge until they were several weeks old and able to run about and in a large measure to take care of themselves. To many people, a small pothole at the base of a cliff—often filled with broken rock (fig. 79)—would seem a hard cradle indeed, yet it affords safety and protection to the lambs which is so essential to their welfare.

The lambs are born from early in May, while there is still considerable snow on the ground, until late in June. In studies made extending over a period of years, considerable seasonal variation has been found in the lambing period. For instance, in 1926, following an early rutting season, the first lamb of the year was noted on May 5 and by the last of May all of

that season's lambs had been born. In 1932, following a late breeding season, the first lamb was seen May 31 and some lambs were not born until the last of June. Two pregnant ewes that became stranded in deep snow were captured by rangers and later were taken to the University of Alaska at Fairbanks where they gave birth to normal lambs on the 17th and 18th of May.

On June 28, 1932, Mr. F. W. Morand, while collecting insects high up amid the crags of Cathedral Mountain, heard a low groaning sound and stealing cautiously around a rocky point he found himself within 6 feet of a female mountain sheep which was in labor. Not wishing to frighten the animal he retreated and stole quietly around to the other side of her where he was 20 feet distant and partly concealed. By that time the lamb had been born and the ewe was standing over it and licking her new offspring. The lamb's cradle was a warm pocket in the rock, screened in on both sides and above by protecting cliffs. Delivery of this lamb had taken only about 15 minutes. As a rule each ewe gives birth to but one lamb per season although at times there are twins. The long-legged, wobbly, fuzzy lambs

Figure 77.—MALE DALL SHEEP ON SUMMER RANGE.
Photograph taken July 22, 1926, Double Mountain. *M. V. Z. No. 5171.*

are a never-ending source of interest to park visitors. They are grayer in color than the adults and in the distance appear to be decidedly darker than their mothers, who keep a very watchful eye over their offspring.

It was found that frequently from six to a dozen ewes and their lambs congregated into a sort of nursery, or school, which was always near protected cliffs or rocks. Thus, on May 27, 1926, in the Savage River Canyon, we crawled up to within 200 feet of a bunch of ewes and lambs. At this time the ewes were in poor physical condition. Their white coats were earth-stained from lying on the thawing ground. Near the same locality on June 5, we found what we took to be the same flock. There were 10 lambs in a close little pasture romping about together. They appeared to love to scamper about the rock piles and sheer cliffs. When alarmed, they would all rush at once to the top of a pinnacle rock where they would stand, bunched together. Then, at a signal they would fairly fly down the steepest

Figure 78.—LAMBS OF THE DALL SHEEP ARE USUALLY BORN AT THE BASE OF SOME SECLUDED CLIFF SUCH AS THAT SHOWN HERE.
Photograph taken July 27, 1926, Savage River. *M. V. Z. No. 5175.*

Figure 79.—SLIGHT DEPRESSIONS FILLED WITH BROKEN ROCKS OFTEN SERVE AS CRADLES FOR THE LAMBS OF THE DALL SHEEP.
Photograph taken June 5, 1926, Savage Canyon. *M. V. Z. No. 5204.*

way only to return and repeat the performance. On numerous occasions we noted that such schools of lambs were always watched over by an old female (fig. 80). There seemed to be some division of labor, since the other mothers seized this opportunity while the youngsters in the nursery were playing under the vigilant eye of their teacher to go off for some considerable distance, in certain cases almost a quarter of a mile, to secure food. The favorite game of the lambs seemed to be follow-the-leader. Each youngster would take his turn at leading the way up the side of a boulder or cliff which seemed unscalable to us. The remaining lambs made every effort to follow in the footsteps of the leader and they usually succeeded. As soon as one circuit had been completed a new leader would start out, choosing a slightly different route. This system of play, which seemed to us to be extremely hazardous, doubtless was nothing but the normal training for young mountain sheep which would enable them to maintain their race and to escape their enemies. Only on one occasion did we see any unusual concern exhibited by the mother for her wayward offspring. In this instance, a

lamb ventured out onto a sloping rock which overhung a sheer drop of about 80 feet. We held our breath as we watched the daring youngster, seemingly headed for certain destruction. The watchful lamb's mother had also taken in the situation and suddenly dropping her seeming indifference she bounded quickly over the rocks and deftly butted her erring offspring back to safety.

In one rocky basin of about 20 acres we counted 34 sheep, all being ewes with their small lambs. At this date, May 23, 1926, the lambs were small enough to walk under their mothers' bodies without touching them. One lamb ran in between its mother's front legs and began to nurse, butting the udder just as a domestic calf sometimes does. While this lamb was nursing, another one of the same size which we thought might be one of a pair of twins started to nurse also; the mother turned around and repeatedly butted it aside. It evidently did not belong to her. We found that the young lambs were not particular about seeking out their own mothers. They would attempt to suckle any nursing ewe. However, the latter had decided objections to nursing the offspring of other ewes so that it was not uncommon to see a lamb try two or three times before he succeeded in finding his own maternal font.

On one occasion we watched a band of 10 ewes and 11 small lambs as

Figure 80.—ONE EWE (*Ovis dalli*) PROTECTED HER LAMB BY STANDING OVER IT, WHILE THE OTHER EWE STARTED TO LEAVE.
Photograph taken May 27, 1926, Savage Canyon. *M. V. Z. No. 5189.*

they fed together on a small bench in an area not more than 100 feet square. While we watched, a golden eagle circled out around a projecting cliff directly over the sheep. The moment the eagle came into sight there was an immediate scamper. The young lambs disappeared as if by magic, seeking safety in the potholes and overhanging cliffs. Within 5 seconds not one of the lambs was in sight, and a period of 10 minutes passed before they began to reappear. We watched them as they came timidly forth from under the overhanging cliffs. On this occasion we were unable to distinguish any signal of alarm on the part of the adult sheep. The lambs simply scattered in all directions upon catching sight of the eagle. During the summer of 1932 I watched several golden eagle nests containing young, but I never found the bones or other remains of lambs in or below any of the nests. In the same locality in June 1908, Charles Sheldon observed golden eagles swooping at young lambs which were protected from such aerial attacks by the ewes standing over them (fig. 80) and thrusting their horns upward at the swooping eagles. On June 7, 1908, at the forks of the Toklat, Sheldon visited a golden eagle's nest and found the bird on her nest while " . . . on the rocks nearby were strips of skin and other remains of lambs, demonstrating that this eagle at least had been successful." Ewes, and their lambs more than 6 weeks old, seem to be indifferent to eagles.

On May 27 we located a band of ewes and small lambs that had bedded down on the very summit of a pinnacle rock. Cliffs dropped away on all sides but one. There was considerable snow in patches at this elevation (about 3,500 feet). Here, for the better part of an hour, I watched two ewes and their lambs. By peeking through a crack in the rock at a distance of 75 yards I was able to study them unobserved. One or the other of the two female sheep stood guard constantly (fig. 80). After a 10 minute period of watching in all directions the ewes changed places. On another nearby rock I found 20 sheep, 10 ewes and 10 small lambs, lying down and chewing their cuds contentedly. The ewes' coats were very ragged and the animals were thin. Their sides and under parts were stained brown from contact with wet soil, although the sheep I observed were resting on well drained, dry ground. After securing a series of photographs I stood up in plain sight. Upon my sudden appearance the old ewe on guard jumped fully 20 feet, straight down into a deep snowdrift on the south side of the rock. One ewe with a very small lamb turned around and tried to escape another way, but finding that this was impossible, she turned back and, leading the lamb, followed the way that the others had taken. It would have been utterly impossible for a man to go down the steep cliff and across the snowslide which was traversed with ease by the sheep. Even the lambs never hesitated a

Figure 81.—A SHEEP LICK (CENTER) ON EWE CREEK. *Photograph taken May 25, 1932, Ewe Creek. W. L. D. No. 2967.*

moment and seemed to enjoy the run. I endeavored to follow the sheep but found this was impossible and was forced to turn back and seek another route. At length I again found the whole band of sheep feeding contentedly on a steep talus slope a thousand feet below.

On July 27, 1926, I found a flock of about 20 sheep sleeping in the shade during the heat of the day under some conglomerate cliffs which formed an outcrop high up on a ridge at an elevation of 5,000 feet. Here I saw an old ewe accompanied by her lamb of the year and by her previous year's male lamb. The latter had horns about the length of those of his mother. They were all feeding together; and they kept together even when I approached. I followed them about for some time in order to make sure that both lambs belonged to this particular ewe. There was no question regarding her anxiety and care for both offspring.

In the McKinley district mountain sheep visit certain "licks" or mineral springs at regular intervals, usually about every other day during the spring. One of the best known licks is located on Ewe Creek (fig. 81), just within the park boundaries on the north side of the secondary range. Here we found that sheep had established regular highways leading from the higher ridges down across the gravel-strewn plain to the springs which cover an area of about one-quarter of an acre. These well-traveled trails (fig. 82) were visible to the naked eye a mile distant and doubtless had been traveled by countless generations of mountain sheep. They were as nearly straight as the contour of the land permitted. Another lick is located on the divide near Double Mountain, between the Sanctuary and Teklanika Rivers. This latter lick is visited perhaps more frequently by caribou than by sheep, although we found numerous tracks of both animals there early in July.

The sheep visit the licks for the mineral salts which they obtain there. It is thought by persons who are familiar with the animals that one reason for sheep visiting the licks in the spring is that certain mineral requirements have been lacking in their winter food. Perhaps such visits may also assist in the shedding of their hair which is molted at this time. The lick on Ewe Creek was located on a high bank of the stream. Several beds of talc were exposed and in one place where the rock is of a purplish-slate color, an area of about 20 by 30 feet is literally covered with sheep tracks where the animals have come to lick and gnaw off portions of the soft rock. In some cases the rock is worn off by licking and undercutting to a depth of 6 or 8 inches. I tried tasting some of this formation which the sheep sought but there was no decided taste that I was able to detect. Samples of the rock were saved and brought back to the University of California, where they were analyzed by Dr. G. L. Foster, of the Division of Biochemistry. He reports that calcium and iron phosphate are the two minerals present in this material which would be soluble in digestive fluids, such as the gastric juices of the mountain sheep's stomach. He also found certain insoluble substances present, chiefly magnesia and silicates. Our observations

Figure 82.—THIS OLD DALL SHEEP TRAIL WAS 14 INCHES WIDE AND WORN 3 INCHES DEEP IN ROCKY GROUND. *Photograph taken June 5, 1926, Savage Canyon. M. V. Z. No. 5203.*

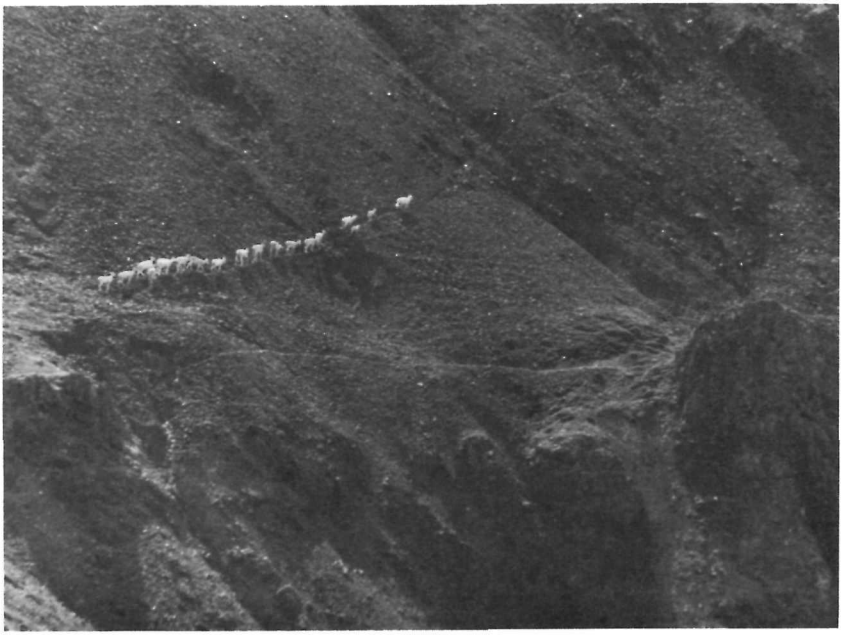

Figure 83.—A FLOCK OF DALL SHEEP RETURNING TO THE CLIFFS FOR THEIR MIDDAY REST. *Photograph taken July 20, 1932, Igloo Creek.* *W. L. D. No. 2719.*

indicate that such licks were not frequently visited by the sheep after the first of June. By the middle of June the sheep move to their summer range, some 15 or 20 miles distant, and there is no opportunity for them to visit these particular licks during the summer.

The mountain sheep's daily program during the summer was as follows: Through the early morning hours, from 3 o'clock until 8 o'clock they foraged about actively, often descending nearly to timber line. By 10 o'clock they returned to the higher cliffs (fig. 83) and during the heat of the day were found bedded down at the foot of perpendicular cliffs or escarpments which protected them from the unexpected approach of any enemy from above. They directed their watch downward and were able to detect readily the approach of any enemy from below. Six o'clock in the evening usually marked the time of the second grazing period in the day.

At Double Mountain on July 9, 1926, I watched numerous bands of mountain sheep bedded down on rocky ledges near the top of a rugged cliff. At about 6 o'clock in the evening the sheep began to come to life and several old rams started down the talus slope to feed in the green

meadows below. Soon there was a veritable avalanche of sheep pouring down the hillside, forming a long stream from the cliffs to the meadows. Sixty-three sheep were counted on one hillside in an area less than 40 acres in extent. The old rams fed fearlessly even down among the willows where the grass was tall and tender. A band of caribou came over the pass and mingled with the sheep as they all fed. Nearly half of the adult sheep were rams; one in particular was very large and had nine growth-rings on his horns. This adult ram stayed with the band of ewes, but another flock of 11 young rams stayed together in a band by themselves. They were very curious and were not afraid of me. Some of them stood and watched me for awhile. Then they lay down though they continued to watch. By walking slowly toward them I was able to get within 50 yards of the entire flock. This band of sheep fed slowly and were still grazing when I left them at 10 o'clock in the evening.

On the evening of June 24, 1926, at the head of Savage River, a flock of from 50 to 60 sheep was observed feeding along the lower edge of a melting snowbank. Just as the last rays of the setting sun turned the whole landscape into gold this flock ceased grazing, walked over to a bare open ridge, dug out beds in the gravel with their front feet, and at 11 o'clock all lay down for a short night's rest.

In traveling from their homes amid the cliffs to the forage grounds below, the sheep pass over rock slides and cause numerous rocks to become loosened and to plunge down the steep slopes. At Double Mountain on July 22 we found that the sheep were constantly dislodging rocks in this way. They were very keen to the first indicating sound of this danger and each member of the flock gave instant heed in order to avoid any jeopardizing slippage from the cliffs above them. We found that it was exceedingly perilous in such localities to try to approach sheep from below. On one occasion a rock the size of a nail keg plunged down the mountainside past us, missing us by a close margin. We found one dead sheep which had been caught and killed in a snow or rock slide and another large ram with a broken leg which we believed had been injured by falling rocks. For this reason, we caution park visitors not to get below the sheep on a rocky slope and to be extremely careful themselves when traveling in a group.

The only time that we heard Dall sheep utter any audible sound was when two yearlings approached a band of four adult rams. On this occasion, while the yearlings were running toward the rams they were heard to make a sound somewhat like the bleat of a domestic sheep, except that it was deeper and harsher.

The sense of sight in the mountain sheep is exceedingly keen, whereas

their sense of smell does not seem to be very sensitive. When observed at close range, their eyes seem very large and dark and in marked contrast to the whiteness of their bodies. Charles Sheldon reports (1930, p. 148) one ewe with yellow eyes. It has been observed that if a person remains off the skyline and motionless, Dall sheep will often pass without detecting his presence—even at 50 yards distance. Too, this may happen when the wind is blowing directly from the man toward the sheep. Thus on June 12, while I was watching a band of these animals as they were returning from a salt lick, they passed within 50 yards of me and were unaware of my presence although the wind was blowing directly from me toward the sheep.

When frightened by some sudden shock the Dall sheep show a slight tendency to rush together. One would naturally suppose that thunder would have little or no effect on them. Contrary to our expectation, the thunder did seem to affect them. On June 1 when we were on one of the sheep mountains there occurred a sudden and extremely heavy clap of thunder. As we looked back, a compact band of sheep was rushing through the pass where we had been a half hour earlier. There were more than 70 in the flock, not counting an abundant sprinkling of lambs. Suddenly there was another clap of thunder and the sheep dashed madly up the steep slope. We had had this flock under observation throughout the forenoon and were unable to ascribe any other cause for their fright than the unusually heavy thunder.

On the whole, the Dall sheep is of a retiring, we might even say timid, disposition; yet he is curious. By repeated experiments we found that if we tried to sneak stealthily up to a band of sheep they would become alarmed and would run away, whereas, if we advanced slowly, in the open, and were visible to the band at all times, in many instances they would be interested rather than afraid and might even advance toward us, if we stopped and remained perfectly still. As a further test we tried making considerable noise, although we remained as nearly motionless as possible the while. Instead of becoming alarmed we found that our shouting merely excited their curiousity. One old ram in particular kept coming toward us, evidently eager to find the cause of all the racket.

On June 28, at the head of Savage River, I approached quietly and very slowly to within 30 steps of a young ram that was very curious to learn what sort of an intruder I might be. This ram, his nostrils dilated, stretched his neck and made every effort to identify me by scenting me. As I stood quietly watching, he shifted around until he was directly to windward of me, but he was evidently still baffled. Finally he indulged in a favorite trick of mountain sheep; he bounded off over the ridge as though in full

flight, but finding that I did not follow he promptly returned and cautiously peered back over a rock pile, just his white head showing and even that blending with the white clouds in the sky.

The enemies of mountain sheep fall into two classes, the first being predatory birds and mammals and the second, man. The golden eagle is a potential enemy of young lambs but apparently does not levy a heavy toll. Sheldon found sheep remains at a nest but these may have represented carrion, for these eagles are known to feed on carrion. Among mammals, the wolf, coyote, lynx, and possibly wolverine prey on sheep but it appears that the sheep are usually able to escape these enemies if they are not surprised too far from the friendly cliffs. This is probably one of the main reasons why the Dall sheep remain close to broken rocky ground and cliffs where they may flee for refuge when pursued by either wolves or coyotes. On June 16, 1932, at 10 o'clock in the morning, I watched a large gray coyote trying to ambush a band of 80 ewes that were attempting to cross a broad low valley between their winter and their summer range. The coyote hid in the low bush near the trail where it crossed open ground. The sheep saw the coyote and several times many of the nervous ewes fled wildly back to the protection of the cliffs. Sheldon (1930, p. 368) let his dog chase a 3-year-old ram, which had a start of 100 yards, in order to observe how a sheep chased by a wolf might behave. The dog gained at first but when the ram made a steep slope he easily kept in the lead, stopping at short intervals, apparently but little worried, to look back at the dog, which soon became too tired to follow. Sheldon remarks (p. 369), "The actions of the ram led me to suspect that a wolf would not have followed more than a few feet up such a slope, its experience, which *Silas* lacked, having taught it that a sheep could easily escape when once headed upward on a steep slope." In May 1932, the remains of three sheep were noted out on the open ground. These sheep may possibly have been killed by wolves. Under normal conditions the sheep seem well able to fend for themselves.

In the Mount McKinley region, man has been an outstanding enemy of mountain sheep. In the olden days, before the park was established, market hunters made a regular business of shooting sheep in the region, and of sending the meat to the mining centers along the Tanana River. According to the testimony of reliable men and also as evidenced by the numerous pairs of bleached horns which still remain in the vicinity of the many crude log shelters that served as winter camps and are still extant along the Savage and Sanctuary Rivers, hundreds of sheep were slaughtered each winter.

The older rams are less fearful of enemies and are more independent than

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are the smaller sheep. This was well shown by the actions of two large males found on July 27, on the very summit of a pinnacle rock. Their eyes were closed and they were chewing their cuds in perfect contentment. Upon my very slow approach from above the younger sheep and the ewes fled, but the sleeping rams allowed me to get within 50 yards of them. Finally the smaller of the two rams, which had a broken horn, possibly injured in some recent fight, detected some slight movement. He stood up and came over to investigate; the larger, 10-year-old-ram—as shown by the growth rings on his horns—continued to doze peacefully until I approached to within 60 feet of him. Even then he did not see me but became alarmed because of the flight of the smaller sheep and the falling rocks from the cliff behind him, and rising to his feet he stood with distended nostrils (frontispiece) looking intently in every direction in his attempt to locate the cause of the disturbance. His only avenue of escape was by way of the narrow ledge on which I was standing, for the cliffs dropped off on all sides from 50 to 200 feet. Suddenly the old ram lowered his head and bounded towards me. One might have thought that the ram was charging at me; however, I feel sure that this was not the case. He made no effort to molest me though he was so close to me as he passed that I could have reached out and touched him. He merely seemed very anxious to escape and join the rest of the flock on the heights.

It has been said that the old rams do not mingle with the ewes and younger sheep during the summertime. For the most part this is true. However, there are exceptions. On July 26 a large band of mountain sheep was found bedded down at the foot of a high cliff on Mount Margaret; in their midst was one old very broad and deep-chested ram, one of the largest of the 3,000 to 4,000 which we observed. At another locality on July 27, near the head of Savage River, two large rams were found bedded down on top of a pinnacle rock. They were accompanied by numerous yearlings and one old ewe with her offspring of the year. At various other times in the latter part of July we found some of the males mixing freely with the adult females and young. Prior to this, that is during May and June, the old rams usually keep in small, isolated flocks, three to eight being found together. By August the young rams, those from 3 to 5 years old, indulge in sparring and fighting, so at this time there is much rushing together and bumping of huge horns.

At Double Mountain on July 22, 1926, the younger rams were beginning to feel belligerent or playful, and we watched numerous jousts or contests. The procedure was as follows: Five or six young rams would congregate forming a circle of from 10 to 12 feet in diameter (fig. 84). A ram would

Figure 84.—RIGHT IS BEING DETERMINED BY MIGHT IN THE CIRCLE OF YOUNG RAMS (*Ovis dalli*) AT EXTREME UPPER RIGHT.
Photograph taken July 22, 1926, Double Mountain. *M. V. Z. No. 5200.*

select an opponent apparently by looking at him intently; then he would back off. If the opponent accepted the challenge he likewise would hurriedly back away until each had retreated a distance of between 20 and 30 feet. Then after pausing a moment they would dash at each other, meeting head-on at the center of the ring. Just before they collided they would rear up on their hind legs and strike their horns together with a resounding thud which was clearly audible to us, as we sat watching the sheep with binoculars, a quarter of a mile distant. This would sometimes be repeated three or four times until one or the other of the contestants was worsted and then a third ram would often step in and challenge the winner. At these times the older rams keep to themselves, but on occasion they were seen to seek the company of some adult ewe.

The mating season of mountain sheep in the McKinley region has been found to vary from season to season. Charles Sheldon, who spent the winter of 1907–8 in the Toklat region studying the habits of Dall sheep, reports (1930, p. 198) that he observed the first actual mating of mountain sheep on November 6, 1907, also that it was the first positive sign of the rut.

The bands of rams had broken up in October and the older rams had traveled about the mountains but they had not joined the ewes until the latter part of October. By November 18, the rutting season was at its height and it "continued until the middle of December." Sheldon (1930, p. 209) points out that at the height of the rut several rams were observed to serve several ewes of the same flock as they came in season, and ". . . not once did any of the four rams show any sign of jealousy or pugnacity." However, if a strange ram from another flock of sheep enters the field during this season his right is challenged by the local rams and a crashing battle ensues. The ewes look on such contests with mild interest and the ram that is beaten merely moves off toward some nearby flock leaving the victor the undisputed master.

To reiterate briefly, in midwinter these hardy sheep, clothed in their heavy coats of long winter hair (fig. 74), seek the comparatively snow-free, high, barren slopes and are seemingly indifferent to the cold and winds.

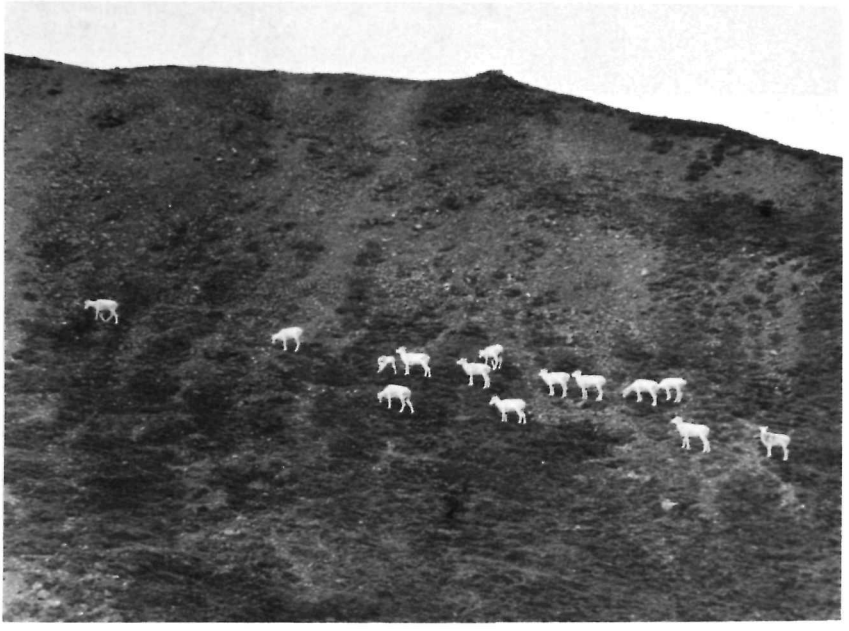

Figure 85.—FOLLOWING A HARD WINTER AND SCARCITY OF FOOD IN 1932, MANY EWES HAD NO LAMBS. NOTE 13 EWES AND ONLY 1 LAMB (CENTER). ORDINARILY, AT LEAST HALF OF THESE EWES WOULD HAVE HAD LAMBS.
Photograph taken August 26, 1932, Sable Mountain. *W. L. D. No. 2713.*

They paw aside the snow in order to reach the stunted growth of grass and herbaceous plants which comprise their food at this season. So long as they remain on the steep slopes they are relatively safe from sudden attacks by wolves or other natural enemies. In August 1932 former Ranger Lee Swisher told me that at that time he did not believe there were more than 1,500 sheep in the entire park, as contrasted with a count and estimate of between 10,000 and 15,000 that he had found present on his patrols over the same area in 1929 when the mountain sheep population was at its highest peak. The explanation of the reduction is not clearly understood but it has been attributed variously to (1) starvation and death caused by heavy snowfall and prolonged winter weather (fig. 85); (2) failure of the surviving sheep to reproduce, due to their poor physical condition; (3) destruction of many sheep by coyotes and wolves. The problem needs careful investigation.

INDEX

NOTE.—The most important page references for each species in this index, covering home, food, mating and similar life history notes, in most cases may be readily located by noting page numbers separated by a dash thus: 118–134. Illustrations for each species are indicated thus: (fig. 10).